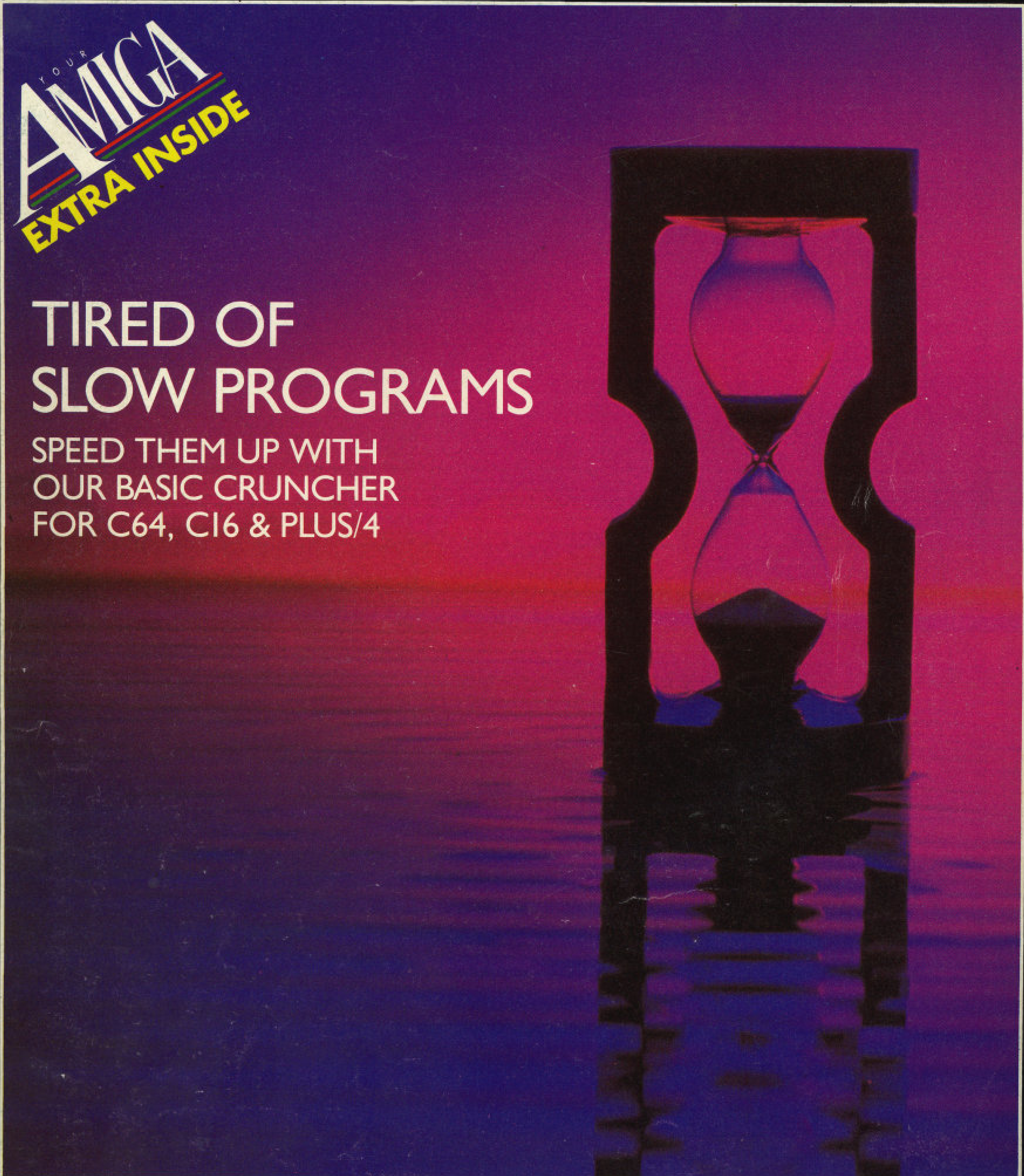
YOUR

COMMODORE

AN ARGUS SPECIALIST PUBLICATION

JULY 1987 £1.10



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6 powerful home and business programs in just ONE package – at a price that simply can't be matched!



It's a brilliant introduction to business computing. The only fault I can find is that it's just too generous for the price – Database could have sold it for a lot more. It makes some of its over-priced competitors hang their heads in shame.
– Commodore User

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YCM7

DATA STATEMENTS

Adventureline

Phantasie III – The Wrath of Nikodemus is about to be released in the UK by US Gold. Here is the final confrontation between a band of adventurers and the Dark Lord Nikodemus and his army of horrible creatures.

Phantasie III is a multiple character role-playing game wherein players can assemble up to six adventurers. They can choose combinations of the eight races and six classes of characters which include humans, elves, swarves, thieves, warriors and wizards. The characters must use their skills to invade difficult terrain, escape from dungeons, destroy demons and finally confront the Dark Lord himself. Over 80 types of monsters must be met in the Myriad dungeons.

The game comes complete with disk, rulebook and data card and will cost £19.99 on the C64/128.

From Gremlin, there's *MASK* featuring the adventures of Matt Tracker.

A battle between MASK agents and the enemy VENOM agents has left the planet battle scarred and almost lifeless. Matt's fellow MASK agents are scattered on earth throughout space and time and Matt must save them using his damaged Thunderhawk transporter.

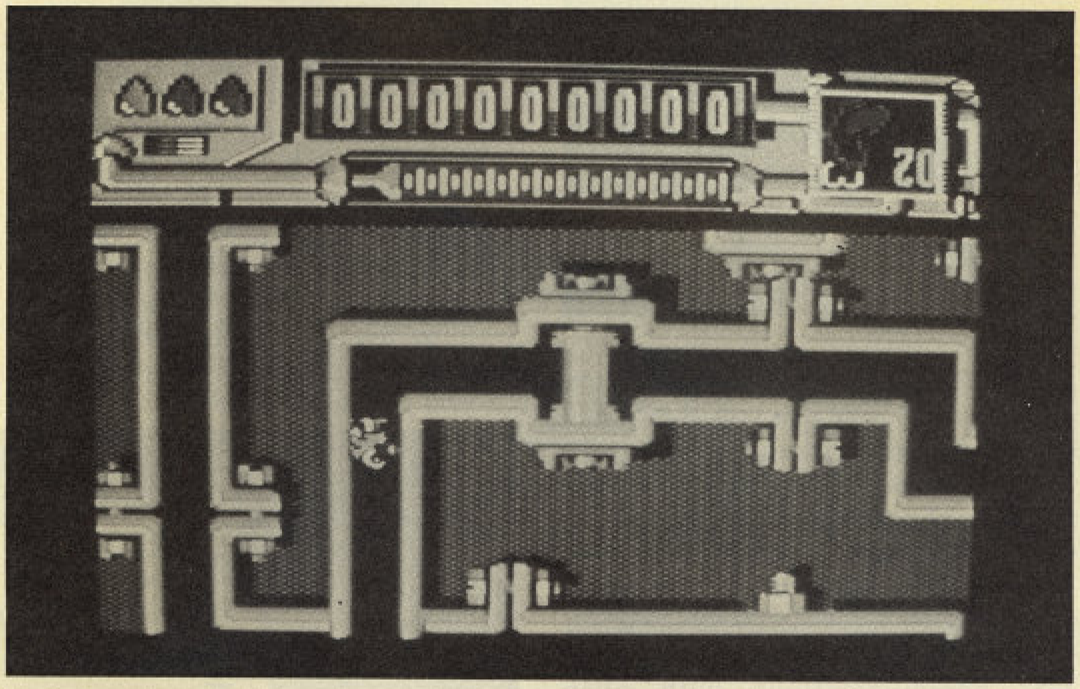
Once Matt has managed to reach earth he faces terrible danger in the shape of flying boulders, runaway trains and live volcanoes. In his quest he must collect items to save his pals while avoiding VENOM patrol craft.

MASK is the first computer game based on the adventure of Matt Tracker and is due for release in July for the C64.

Touchline

US Gold: *Units 2&3, Holford Way, Holford, Birmingham B6 7AX.* ***Tel:*** *021 356 3388.*

Gremlin: *Alpha House, 10 Carver Street, Sheffield S1 4FS.* ***Tel:*** *0742 753423.*



In The Arcade Style

Gremlin has bounced back into the arcade games field with two new rubbery releases – *Re-Bounder* and *Thing bounces back.*

Bounder, the star of the C64 game *Re-Bounder*, is a tennis ball that doesn't need a racquet. In a 3D world of colourful hexagonal slabs, collapsible floors and high speed bouncing, Bounder must hurtle through 18 levels of enemy thronged scrolling platforms in order to reach the Master Alien. Fleets of aliens bar his path and a sentinel awaits at the end of each level to provide further problems. Bounder can defend himself with fire power and armour plating, to be picked up along the way.

Thing on a Spring returns in a sequel entitled *Thing Bounces Back.* Having dealt with the toy goblin in his first escapade, he must now stop the factory computer which is auto-producing toys.

In his re-programming adventure he can alter the layout of rooms and can travel through the factory pipe network, whilst picking up software to aid his task. Weird goblins lurk in all locations, anxious to deplete Thing's oil stocks in order to make his spring seize up

Available for the C64, Thing is in the shops now.

Pirhana has announced a new arcade game for the C64 which will be available in September. *The Astonishing Adventures of Mr Weems and The She Vampires* features Weems, a failed accountant and lion tamer, hunting vampires with a rapid fire garlic gun.

Attacked by sharp ganged bats, dumb Frankestein monsters and thirsty She Vampires, Weems is fighting his way through the Vampire's mansion for a confrontation with the Great She Vampire herself.

Ariolasoft has finally managed to release *They Stole a Million*, a game originally scheduled for December 1986.

Product Manager Mark Easton said: "We were caught on the job alright, the dalay meant an extra three months hard labour for us and plenty of ackers down the tube on pre-Christmas promotion." The game is now available on the C64/128, on cassette at £9.99 and disk at £14.99.

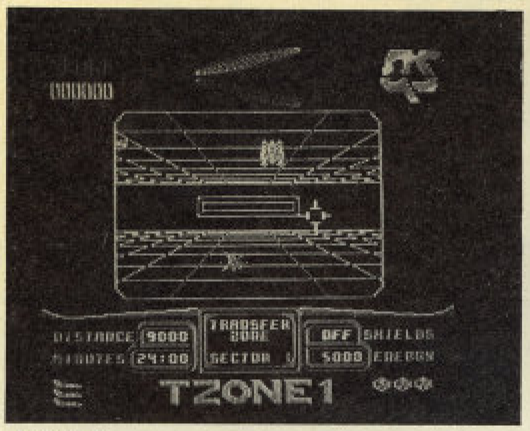
Touchline:

Gremlin: *Alpha House, 10 Carver Street, Sheffield S1 4FS.* ***Tel:*** *0742 753423.*

Pirhana: *4Little Essex Street, London WC2R 3LF.* ***Tel:*** *01 836 6633.*

Ariolasoft: *68 Long Acre, London WC2E 9JH.* ***Tel:*** *01 836 3411.*

DATA STATEMENTS



The Tube.

Into Space

Enterprise is a new release from Mastertronic in which you, a criminal from Earth, must go and try and make your fortune by trading with the millions of aliens in outer space.

However earth's problems of poor ecoomy are common to the other planets in the universe.

Enterprise features 3D graphics text communications with alien computers, plus a flight simulator to land on each of the planets.It will be available soon for the C64, priced at £8.95.

In *Zynaps*, a new space shoot 'em up from Hewson, you must try and escape the horrors of captivity on an alien planet using your skill and lightening reactions to avoid asteroid storms and missiles. Styled in comic book format, the game sill be based around chapters and episodes. There are over 450 screens of scrolling action. Your aim, to reach the alien stronghold so the final conflict can begin.

Zynaps is priced at £8.95 for C64 cassette and £12.95 for the disk version and the release date is set at June 29.

Another alien zapping game has just been launched by Quicksilva. Entitled *The Tube*, the game features a complex control panel on the screen at all times to keep you informed about yoru status' energy, time, distance and shields. It's available on both cassette and disk for the C64 at £8.95 and £12.95 respectively.

Touchline

Melbourne House: *8-10 Paul Street, London.* ***Tel:*** *01 377 6880.*

Hewson: *Hewson House, 56b Milton Trading Estate, Milton, Abigdon, Oxon OX14 4RX.* ***Tel:*** *0235 832939.*

Quicksilva: *Victory House, Leicester Place, London WC2H 7NB.* ***Tel:*** *01 439 0666.*

Print Outs

Star Micronics has recently launched the *ND-15* dot matrix printer.

The new model provides draft printing at 180 characters per second and near letter quality at 45 cps. It has been desgined for the budget conscious user and is priced at £489. As with all Star models, the ND-15 features a front panel which takes the drudge out of fiddling with DIP switches for commonly used functions. Via the panel, the user can select print mode (draft or NLQ), choose pitch settings, access the form length control, set margins and carry out several other functions.

Tractor feed and semi-automatic sheet feed are fitted as standard, and an available option is a low cost automatic cut sheet feeder. The front panel also provides forward and reverse micro-feed control.

Also standard is the Star slot-in interface which ensures connection to all major micros.

Touchline

Star Micronics: *Craven House, 40 Uxbridge Road, London W5 2BS.* ***Tel:*** *01 840 1800.*



And From US Gold

Activision and Telecomsoft have come to an agreement to release nearly 40 previously full price Activision titles on the Firebird Silver label at £1.99.

Silver Range boss Chris Smith said: "There are some really cracking games here for £1.99. Titles such as *Back to the Future, I of the Mask* and *Pitfalls I and II* head the series." There are also three games brand new to the European market: *Breakstreet, Futureball* and *Pyramids of Time* all for the C64.

Pack Patrol for the C64 was recently released under licence from Activision on the silver label and was very successul. Rod Cousens of Activision commented: "The success of *Pack Patrol* prompted us to contemplate the re-release of our back catalogue in the budget sector. Telecomsoft had clearly demonstrated their effectiveness to us, and it made sense to conclude an arrangement which was in the interest of all concerned."

The first titles will be in the shops in the early summer and the rest will follow over the next two years.

There are three new Firebird titles for the C64 already in the shops. *Gunstar* is a fast shoot'em up in which you have to destroy the alien forces which are terrorizing the earth. The first state involves shooting alien craft whilst avoiding their fire, while in the second stage you must dodge asteroids in the asteroid minefield. Finally, as

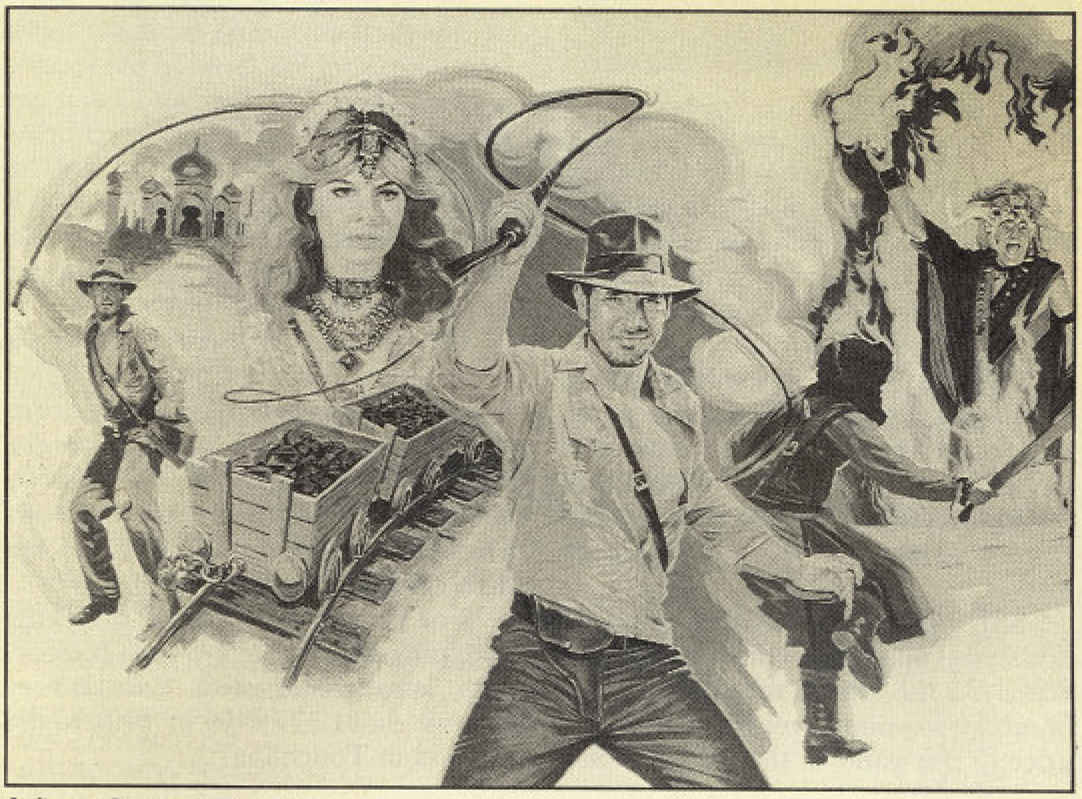
DATA STATEMENTS

commander of the Gunstar fleet you must annhilitate the alien command ship.

In *UFO* you must pilot the F21 Condor, the only craft capable of combatting the UFOs which are closing in on New York. However, watch your step because the F21 is still experimental and many things could go wrong before youcomplete your mission.

Finally, on a more down to earth level, you could choose to guide *Gerry the Germ* around an unfortunate human's body. Gerry needs to try and cause as much damage as possible, ultimately ending in a heart attack. Is this a truely 'sick' game?

Football Manager, an addictive game you must surely have heard of, has now been released by Prism as a budget title. If there are any C64, C16 or Plus/4 owners who don't possess this all-time favourite, take heart. You can now buy it for just £2.99.



Indianna Jones – Coming soon.



Budget disks from Players.

There are two new C64 titles from Mastertronic. *Frenesis* is in the £1.99 range and is a 40 level shoot 'em up. *Voidrunner* is £2.99 and is a Jeff Minter zapping game.

The power House has released *Hercules* for the C16. As C64 owners may know, it's a platform game based on the ancient Greek myth of the 12 labours of Hercules. The price is only £1.99.

Finally, budget software house, Players has come up with affordable disk based software. The two game packs are now in the shops priced at only £4.95 for the C64/128. The first in this range features the two games *Fruity* and *Fungus*.

Touchline

Telecomsoft: *First Floor, 64-76 New Oxford Street, London WC1A IPS.* ***Tel:*** *01 379 6755.*

Prism: *Unit 1, Baird Road, Enfield, Middx ENI ISJ.* ***Tel:*** *01 804 8100*

Mastertronic: *8-10 Paul Street, London.* ***Tel:*** *01 377 6880.*

The Power House: *204 Worple Road, London SW20 8PM.* ***Tel:*** *01 879 7266.*

Players: *Mercury House, Calleva Park, Aldermaston, Berks RG7 4QW.* ***Tel:*** *07356 71500.*

Budget Software

US Gold has announced the release of three electronic novels from Broderbund.

Mindwheel, Essex and *Brimstone* are all interactive adventures specially written for computers and each comes with its own hard back novel.

Mindscape allows you to enter the minds of four deceased geniuses in order to retrieve the Wheel of Wisdom, civilisation's only hope of a salvation.

Essex is an intergalactiv adventure featuring the colossal Starship Essex. You must lead a mission to save Professor Klein by combatting the evil Vollchons in deep space. The survival of the universe is at stake.

Finally, *Brimstone* gives you the opportunity to relive the adventures of the ancient Albion manuscripts and travel into the underworld realms of Ulro.

All the novels are disk based and priced at £24.99 for the C64 versions.

Also, we've received news that US Gold is releasing *Indiana Jones* for the C64, a game based on the very popular films featuring the Harrison Ford character. Look out for more news on this.

Touchline

US Gold: *Units 2/3 Holford Way, Holford, Birmingham B6 7AX.* ***Tel:*** *021 356 3388.*

DATA STATEMENTS

Wargaming

Wargaming seems to be becoming more and more popular with computer games players. Here's a quick rundown of the many new titles available in the coming weeks.

Colonial Conquest is from US Gold and is a game of world domination for up to six players.

PSS, a company specialising inw ar simulations is releasing a three game pack priced at £12.95 on cassette and £17.95 on disk for the C64. The games featured in this collection are *Battle of Britain, Theatre Europe* and *Falklands 82.*

SSI, American based war game house, has announced the forthcoming B24 a World War II simulation of 19 bombing missions over Rumania. The price of this game in the US is $34.95, but maybe you should look out for it over here from US Gold in the future.

Also from SSI for the C64 is an American Civil War game entitled *Rebel Charge at Chickamauga.* The game recreates a two day battle which took place in September 1863. It would set you back $49.95, if you could get across the Atlantic to buy it.

US Gold has also come up with a compilation for the C64. *War Game Greats* features historical battles from World War II in the games *Battle for Normandy, Knights of the Desert, Combat Leader* and *Tigers in the Snow.* Cassette version costs £14.99 and the disk version is £19.99.

For those of you having problems with mirrorsoft's *Strike Force Harrier,* help is at hand with the Harrier Hotline on **01 377 4900** or write to the address in Touchline.

Touchline

ssi; *1046 Rengstorff Ave, Mountain View, CA 95043.*

PSS: *452 Stoney Stanton Road, Coventry CV6 5DG.* ***Tel:*** *0203 667556.*

US Gold: *Units 2/3, Holford Way, Holford, Birmingham B6 7AX.* ***Tel: 021 356 3388.***

Mirrorsoft: *Harrier Hotline, Maxwell House, 74 Worship Street, London EC2A 2EN.* ***Tel:*** *01 377 4900.*

Recruitment Program

It's the time of year when software houses are fighting to snap up bright young programming talent, so look out for the ads.

Audiogenic has announced a big incentive to would-be star programmers. Any Audiogenic programmer whose game gets in the Gallup top 10 will be given a Commodore Amiga 500 worth over £500. For a program that reaches the number one spot, there's an Amiga 2000 with a hi-res monitor, worth over £1500. These bonuses are in addition to the normal royalties.

Audiogenic's Peter Calver said: "We're looking for top people, not necessarily those who've already made a name for themselves, but the ones who are about to reach their peak."

Code Masters, the budget software house has been offering high conversion fees to programmers. Recently the company offered £3000 for a Spectrum version of *Grand Prix Simulator*. Code Masters also needs programmers to convert 12 other titles.

Code Masters' Jim Darling said: "We are currently spending in excess of £31,000 converting our titles to other formats. To all intents and purposes our budget for top quality original games is almost unlimited. We are determined to produce games of outstanding quality.

Superior Software claims to have had a fantastic response to its recent recruitment campaign which involves supplying applicants with a free booklet to put them on the right track.

The author of the book, *Success in Software*, is superior's MD Richard Hanson. He said: "So far, we have been receiving an average of 75 replies a day to the advertisements and the feedback from recipients of the booklet has been extremely positive. We have received a number of programs that we intend to launch during the next 18 months, but most importantly, we have found authors for many of our premier 1987/8 projects."

There is still work available from Superior. Copies of the booklet can be obtained by sending details of your abilities to Richard Hanson at the address in our Touchline.

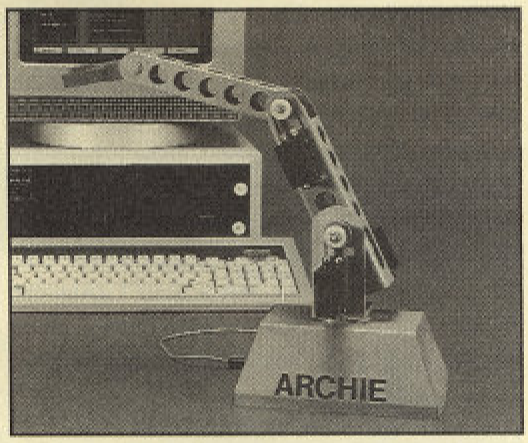
Touchline

Audiogenic: *12 Chiltern Enterprise Centre, Station Road, Theale, Berks RG7 4AA.* ***Tel:*** *0734 303663*

Code Masters: *1 Beaumont Business Centre, Beaumont Close, Banbury, Oxon OX16 7RT.*

Superior Software: *Regent House, Skinner Lane, Leeds LS7 1AX.* ***Tel:*** *0532 459453.*

Robot World



Now there is a build-your-own-robot kit available which may even prove to be an educational aid for youngsters.

Educated Archie is a mini robot that emulates more sophisticated industrial types. It has been developed by Oxbridge Technology of Milton Keynes for use with home computers including the C64.

Supplied in kit form with concise instructions *Archie* can be assembled in about two hours by anyone who can use a screwdriver and a pair of pliers. Then, it is simply connected to a power pack and the serial port of your C64, the software disk is inserted into the drive and *Archie* is ready to go.

Archie's instruction book is written in standard English and options which appear on your screen guide the user through different sequences so that learning can be achieved easily by practice.

Archie has the ability to pick up and place objects and hold and use tools. Its manipulative arm has a wrist and elbow and a sensitive hand which can grip objects of up to 250gms in weight.

This fascinating robot is priced at £220 and is available from the makers.

Touchline

Oxbridge RDA: *Breckland, Saxon Street, Lonford Wood, Milton Keynes MK14 6LD.*

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METACOMBO LISP	~~£149.95~~	£129.95
METACOMBO TOOLKIT	~~£39.95~~	£34.95
METACOMBO SHELL	~~£49.95~~	£39.95
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A1000 version	~~£494.50~~	£449.00
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1571 DISC DRIVE £249.95
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Please add £1.00 towards carriage and packing on any software order.
Hardware orders add £1.00 under £65.00 value, and £5.00 over £65.00 value.
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I.Q.

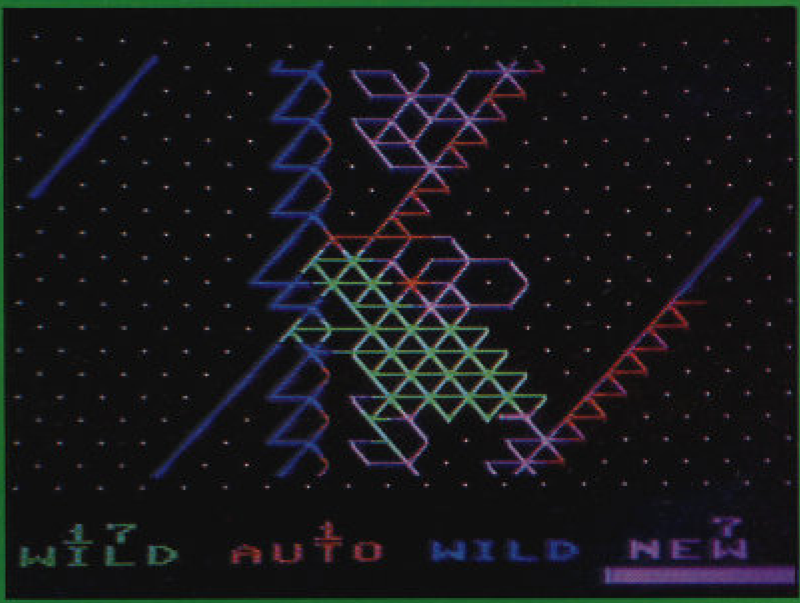
If you hate shooting aliens and feel that you need something more intellectual to stimulate your grey matter, then look over this selction of games.

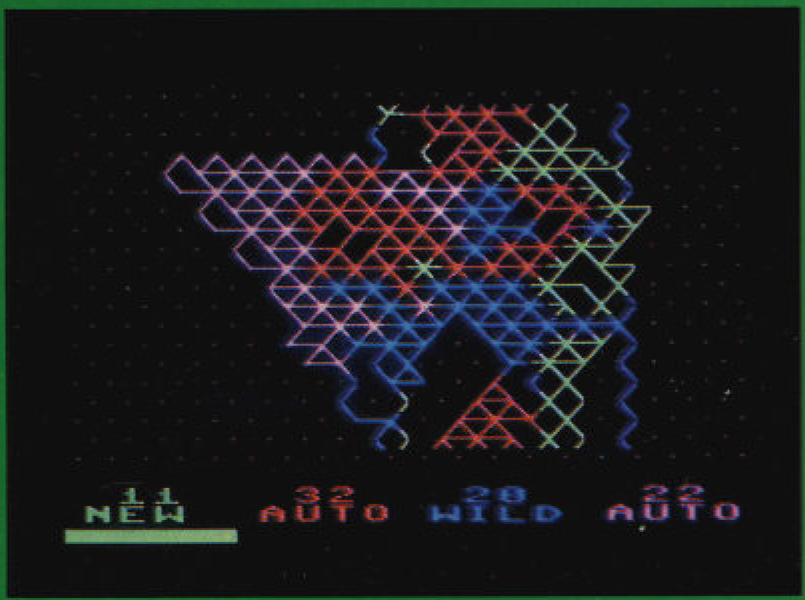
I.Q.

An appropriate title for this section of the magazine and a strange game to boot. Do you remember the game of boxes that you used to play as a kid? A pattern of dots was drawn on a piece of paper and players took it in turns to join two of the dots together. If you completed a square, you could put your initial in it and have another go. I.Q. is a sort of computerised version of boxes.

Instead of having squares to complete, there are hexagons. Each dot is surrounded by six others and if you can complete the sixth of the spokes emanating from a dot, then the territory becomes yours. So far, there is nothing to suggest anything out of the ordinary. What is different about I.Q. is that you can train your playing piece to move round the board for you.

The piece is called a SAIL – super artificially intelligent lifeform – and it works as follows. As you make the first few moves, the sail 'remembers' how it responded in a certain situation. If it encounters the same position again, it will move the same way again. The simplest patterns are straight lines and zig-zags. Your sail will continue to lay a trail until it comes to a pattern that it does not recognise. You must then input the next move.





You can play against up to three different opponents, either human or computer. As a new trail is laid to a particular territory, so all the trails in that territory change to that colour. The result is a spectacular blur of changing shapes and shades – a sort of thinking man's Psychedelia. If a trail has no exit from a territory, it dies. This is the usual case when two colours are converging on the last two spokes of a territory. When all the trails are dead, the game ends.

I.Q. is a strange, most original game. Initial bewilderment soon turns to fascination but I have considerable doubts as to whether there is any great lasting appeal. There was no compulsion to try and do that little bit better and work out what the best tactics were – an essential requirement for any strategy game. **G.R.H.**

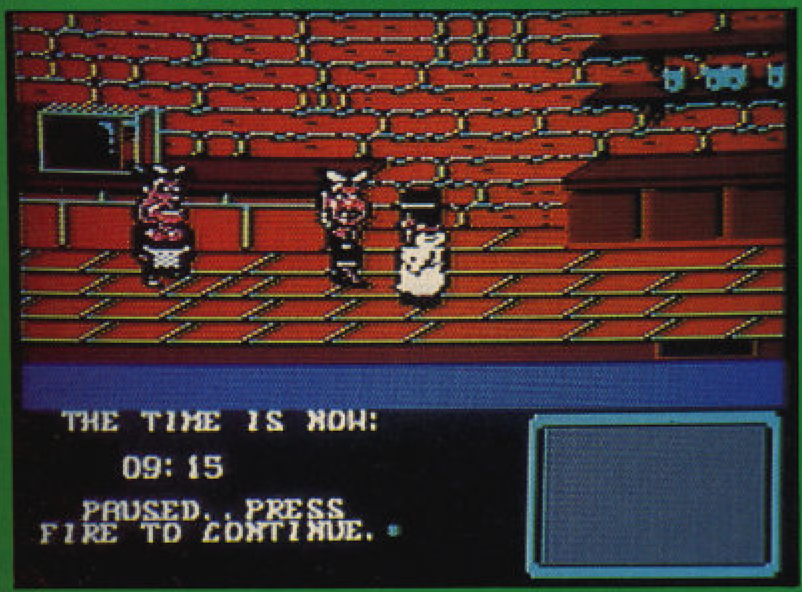
Touchline
Title: *I.Q.* ***Machine:*** *C64.* ***Supplier:*** *CRL, 9 Kings Yard, Carpenters Road, London E15 2HD.* ***Tel:*** *01 985 6877.*
Originality: *10/10.* ***Graphics:*** *4/10.* ***Playability:*** *6/10.* ***Value:*** *5/10.*



THE DETECTIVE

A private eye should expect some peculiar cases from time to time but none were stranger than the MacFungus case. A message is left anonymously that this well known rich eccentric has died. The circumstances seem to be decidedly dodgy so you – Inspector Snide – decide to investigate.

The Detective is an icon driven graphic adventure. You are free to wander at will round MacFungus' huge mansion, the border flashes if there is anything around that may be of interest to you. A quick press of the fire button brings up a series of icons representing your possible actions. Which icons appear depend on your situation at the time. For example, the 'question' icon will not appear if there is no-one else in the room to talk to.



The other guests in the mansion are the typical selection of weirdos found only in murder mysteries. A dodgy vicar, a mad, retired army type and the inevitable butler who, the instructions assure us, is the one who did the dastardly deed, or deeds plural as several other accidents quickly occur. The young lady of the house was soon squashed by a falling piano, obviously playing in the key of A flat minor!

Your first task will be to map the house, although the secret passages may prove tricky. The interaction between you and the guests is minimal and I found it annoying that they would tell me that a murder had been committed but not where. Another example is that when you start the game, the butler says that he will show you to your room and then takes you on a wild goose chase all over the house. Couple this with a less than friendly icon system and an abundance of spelling mistakes and the game quickly loses whatever initial appeal it had.

G.R.H.

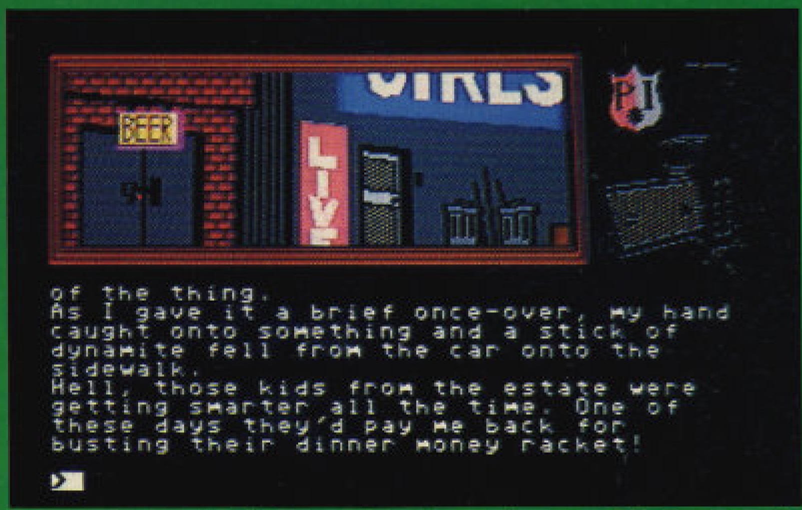
Touchline

Title: *The Detective.* ***Machine:*** *C64.* ***Supplier:*** *Argus Press Software, Victory House, Leicester Place, London WC2H 7NB.* ***Tel:*** *01 439 0666.*

Originality: *6/10.* ***Graphics:*** *6/10.* ***Playability:*** *4/10.* ***Value:*** *4/10.*

THE BIG SLEAZE

In New York in 1930, time of the Great Depression, there was only a job of work available to you if, like Sam Spillade,



you were a real thicko, private investigator. Of course, this presupposes that you will of course find something to investigate but the area that you work out of is rough and the dames smooth in all the right places so it shouldn't prove to be too difficult.

Thus, you find youself in the office waiting for an adventure to happen. Sure enough, two cases suddenly appear. The game would be a bit boring otherwise. A curvacious broad has lost her rich daddy and someone else is being blackmailed over a photograph. As both cases come complete with cheques, you are back in business again.

From here, the plot goes rapidly downhill. Written by Fergus McNeill, author of The Boggit and Bored of the Rings, it is one glorious send up from start to finish of every American detective story you have ever read. The atmosphere is superbly built up and the humour, while not being the sort of thing to show a maiden aunt, is guaranteed to raise a titter or three.

The game loads in three parts although you will need to complete one part before you are allowed to progress to the next. The parser is more than adequate and I couldn't find any examples of obscure vocabulary being used.

As is usual with this type of game, it is difficult to say very much about it without giving away the plot or spoiling the jokes but suffice to say, this is my favourite McNeill creation to date. Go and buy a copy. You won't be able to keep your face straight when watching the Maltese Falcon ever again.

G.R.H.

Touchline

Title: *The Big Sleaze.* ***Machine:*** *C64.* ***Supplier:*** *Piranha Software, 4 Little Essex Street, London WC2R 8LF.* ***Tel:*** *01 836 6633.* ***Price:*** *£9.95.*

Originality: *8/10.* ***Graphics:*** *6/10.* ***Playability:*** *8/10.* ***Value:*** *8/10.*

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Slimline 64

Fed up with the way your C64 looks? Give it a super slimline look with a new case.

By Stuart Cooke

Commodore 64 computers have had the same boring look for a number of years now, only with the recent advent of the 64C has the tried and tested computer had a face lift and been made to look a little more modern.

Owners of what are no doubt grubby, scratched, coffee stained old style cases can now give their C64s a bright new look by replacing the case with Slimline 64 from Evesham Micros.

The case is a straight replacement for the existing one. All of the computers inards being transfered to the new one. If your old case was in the same state as mine then the best place for this is probably the bin.

Fitting the case is simplicity itself and should present no problems to anyone with even a rudimentary knowledge of how to hold and use a screwdriver.

Three screws hold the C64 old style case together, removing these and removing the keyboard connectors from the circuit board splits the case into its two components. The keyboard and circuit board can then be transfered to the new case by simply unscrewing them from the case. Once this is done few screws simply hold the new case together.

Low profile

The Slimline 64 case is a vast improvement on the old case. The keyboard is much lower at the front making it much easier to type on. I hate the high keyboard on the normal C64 and find that it makes my wrists ache when typing for a long time. I suppose that this is really personal preference but I do like the lower keyboard.

C64 owners that have reset switches and *Dolphin Dos* will be pleased to know that there are holes in the rear of the case ready made for their associated switches. This means that you don't have to get your electric drill out to fit them, and you certainly don't have to have wires hanging out the back like I've seen on many C64's.

The Slimline 64 case is a little wider than a normal case. The area behind the keyboard being lengthened. Be warned, even though this area looks as though it might be nice to support your TV etc. on, it isn't as sturdy as it looks as a press on the top of it will show.

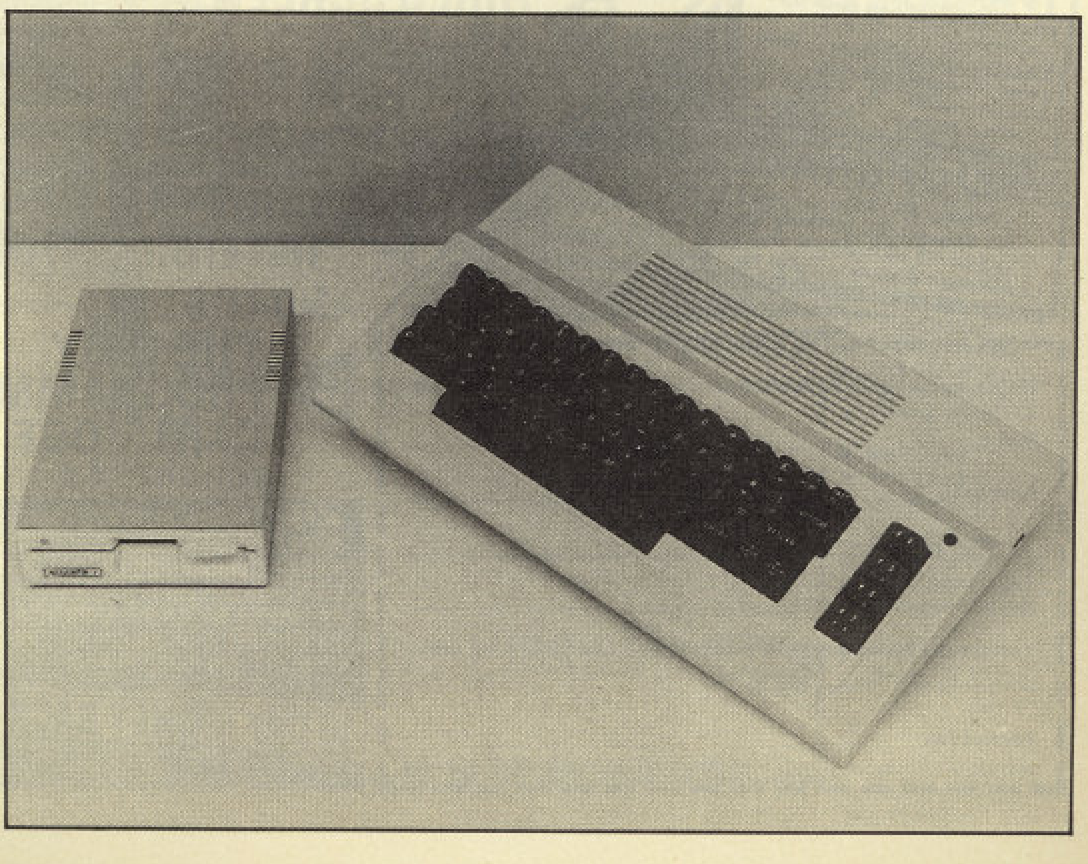
The Slimline 64 case is a vast improvement on the old style. It not only looks nicer but does make it a lot more comfortable in use. My only question is, why didn't someone think of it before?

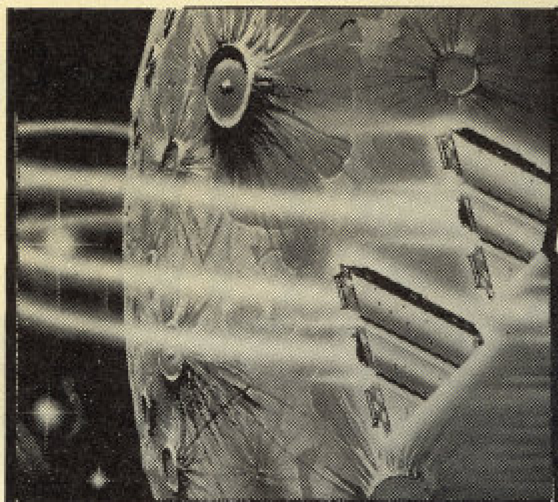
Touchline

***Name:** Slimline 64. **Supplier:** Evesham Micros, 63 Bridge Street, Evesham, Worcs. WR11 4SF. **Tel:** 0386 41989. **Machine:** C64. **Price:** £19.95.*

YC

Slimline 64





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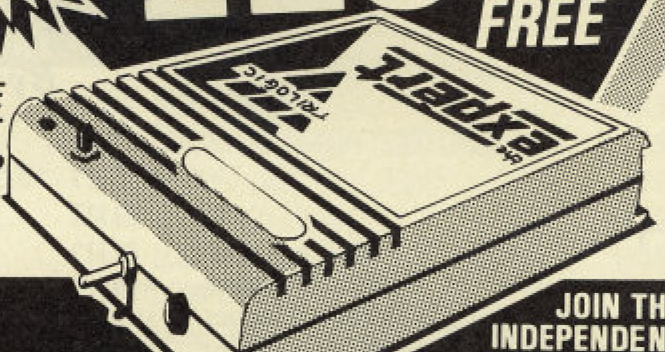
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School Room

We bring you the latest in educational software to make those exams just that little bit easier.

By Margaret Webb

This month I will be looking at two different sets of disk based educational software, each with its own characteristics and merits.

The first set came from Cronos Software, a small company based in Ormskirk and comprised of two mathematics programs aimed at opposite ends of the age spectrum.

Maths Trek sets out to help the junior school child to manipulate numbers and arithmetical operators. The program is set out as a board game and the child must get the best score to win. The idea of the game is to beat your opponent and to get from the start to one hundred before he does. The opponent can be either the computer or anther human. In a manner similar to snakes and ladders; the game allows you to send your opponent back squares by landing on him and to move forward by landing on a designated number. Skill is a major factor in this game. The computer generates three numbers (all less than 10) and the player must use the numbers in the order given along with the arithmetic operators (each only once) to generate a sum. The idea is to create the sum which will give you the most advantageous, although not necessarily the highest, score. The game does have an addictive quality but is a little dull in presentation. More development of the graphics is really necessary to give a product which will appeal to children.

The second program, *Accounting Part 1*, is, as its title suggests, an accounting tutoprial. It is aimed at 'O' and 'A' level students and those taking other similar examinations. The program acts as a simple teaching aid offering revision and self tuition. In content, you get a series of pages of information interspersed with test questions which check your grasp of the material. Whilst the program will operate on its own, it is probably best used with an appropriate text book.

Overall, these offerings from Cronos are adequate in content but they do have a couple of faults. First, they aren't too exciting in their presentation. Computer users are becoming choosier nowadays and expect more sophisticated graphics. Because of the small market for educational software, software houses must pull out all the stops when preparing programs. The American products and many of those on the BBC have shown what can be done.

Secondly, the amount of material on the disks didn't really represent good value at £7.95. I would expect at least two programs of the size of *Maths Trek* for the asking price. With budgets being so small, schools will only buy software which gives them value for money.

Both of these faults can be easily rectified and I look forward to seeing what Cronos come up with in the future.

The second offering, presents quite a contrast. School Software, a company based in Limerick, offers a range of software for the BBC, Amstrad and 64 and, from what I have seen, it's quite meaty in content.

A wide range of subjects are covered, four of which fell through my letter box. All of the programs seen have the similar format of optional study notes combined with test questions. This allows you to decide whether you are learning or revising. Inevitably, the content is too cursory to provide sufficient detail for written exam answers and the simultaneous use of text books is mandatory.

Better Spelling is aimed at the eight to adult range. This program overcomes some of the problems discussed in this column in the October issue of *Your Commodore* and succeeds in teaching the subject quite well. There is a menu of 16 items to choose from, each dealing with a specific area. Such subjects as plurals, prefixes, silent E, tenses, particles etc. are covered in a first group of nine options. In these options, you must type in the required word. A second group of seven options covers common spelling errors. This time you must fill in the gap in a sentence. For example, the use of to, two and too is covered as is been and being. Each test ends with a score of your performance and the option to make a hard copy of your printer. Some effort has gone into making the program attractive with the same graphical effects but it's still not quite there.

The other three packages were *Physical Geography*, *Map Work* (Britain and Ireland) and Physics 1. All were suitable for ages for 12 years upwards. These packages are again split into a number of sections covering various topics within each subject. The use of graphics is much more in evidence and is of a better standard.

All of the School Software programs are of a decent length and give you plenty to do. I cannot comment on their value for money since the brochure I was sent didn't have any prices (it did, however, have an order form!). They are, however, good quality products which perform their purpose well.

To some extent, these packages epitomise the problem with writing software for education. On the one hand, you must have input from the teachers so that the content and method of presentation of the material is sound. And, on the other hand, you must have the abilities and creativity of the programmer to ensure that an attractive and efficient program is prepared. Whilst all of the programs discussed score quite well in the first area, they don't all do so well in the second. I feel that perhaps Cronos should particularly note this.

Notwithstanding this caveat, these products will teach you and they rate quite well against the opposition. YC

TOUCHLINE

Cronos Software: ***PO Box 8, Ormskirk, Lancashire L39 5HH.*** *School Software Ltd:* ***69, Meadowvale, Raheen, Limerick, Ireland.*** *Tel:* ***061-27994.***

Letters

If there's anything you want to know or anything you want to say, just write in to this page and we'll try and oblige.

Printing cost

Many people brag about the facilities provided by their printers, but little is said about its running costs.

These days, you might easily buy a bargain printer, only to discover that you have to pay through the nose for paper and cartridges.

If you can't find a model which also prints money, perhaps you should consider the following money saving advice.

Firstly, if you are planning to buy a printer, look for one which accepts ordinary paper, printer paper can be two or three times as expensive. In this respect, the Commodore MPS 803 is a good buy, even though its typeface is not grand.

Once you've got a printer which accepts single sheets, you can save a fortune on those expensive cartridges by using carbon paper, as you would on a typewriter. Simply use the top page over and over again or print straight on to the carbon paper. In this way, you can have up to 40 pages of excellent printout on one page of carbon paper, costing a couple of pence.

Finally, for run of the mill printouts like listings, use photocopying paper which you can get for around £2 for 1000 sheets.

B. Henry Lehman, London.

Cheap and Cheer

I thought I would write and let other readers know about a nice little earner that certain people have hit upon.

There are a few companies that are advertising their great way of writing on both sides of a 1541 5¼" disk. They say it will let the 1541 ignore the read write tabs, the unpunched edge of the disk, and indeed it does do this.

The companies are asking £4 and in return they will send you the parts and instruction on how to do this.

I already knew the procedure and what parts were needed, however, I though I'd send off just to find out what was going on.

For £4 I received a 20p resistor and the directions on how to fit it.

I'd like to inform other *Your Commodore* readers of this rip off and make my own offer. If anyone wants this information free, then all they need to do is send me a stamped addressed envelope and I will supply the information. Please remember the s.a.e. as I am unemployed and cannot afford the postage.

James Strange, 165 Ashton Hill Lane, Droylsden, Manchester M35 6FH.

Dumpers Delight

Congratulations, *Your Commodore* and especially Mike Healey, for the Plus/4 Dumper program which appeared in a recent issue.

I actually wrote to the editorial department a short while ago requesting just such a program to dump the hi-res screen but to an MPS 803 printer. It works very well and required only one small alteration to make the text dump work also. Many thanks.

I would like to ask if there is any way to make the 803 double strike when printing text? Just the ability to disable line feed would do the trick. I can't find a way but perhaps one of *Your Commodore*'s expert readers knows how to do it.

E.A. Laurenti, Cheltenham.

As far as we know, it is not possible to get double strike on an MPS 803 because the printer has an auto line feed. We're glad that everybody has found the Plus/4 Dumper program so useful. If you are interested in seeing a particular type of program published, then please drop us a line with your ideas. We'll do our best to oblige but we can't promise anything.

Note

At the *Your Commodore* office we receive hundreds of letters from readers every month. We do try and answer each individually but sometimes this is impossible due to pressure of work. If you have written to us and not received a personal reply, we apologise for this but we cannot promise to reply to every item of mail we receive. If you feel that your question or letter really needs an answer, then inclusion of an s.a.e. will guarantee a reply, although this may still take time to arrive.

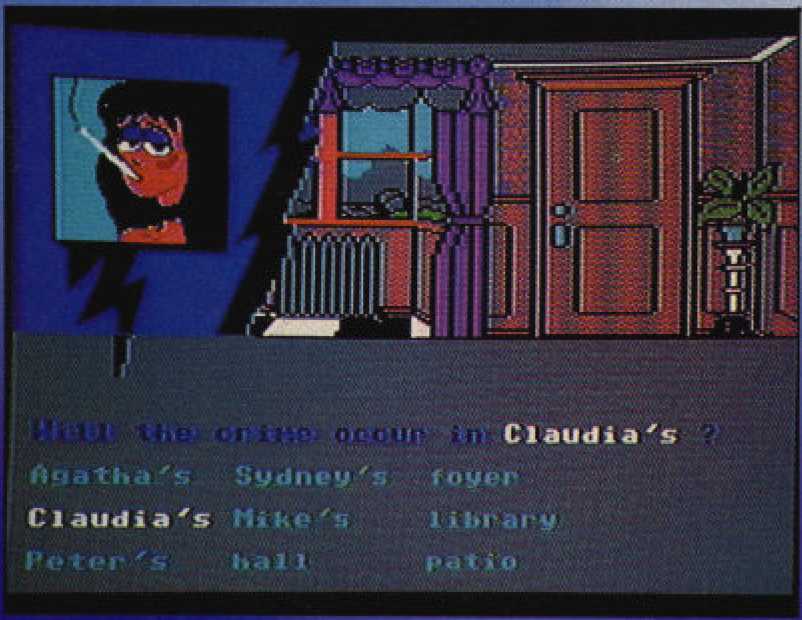
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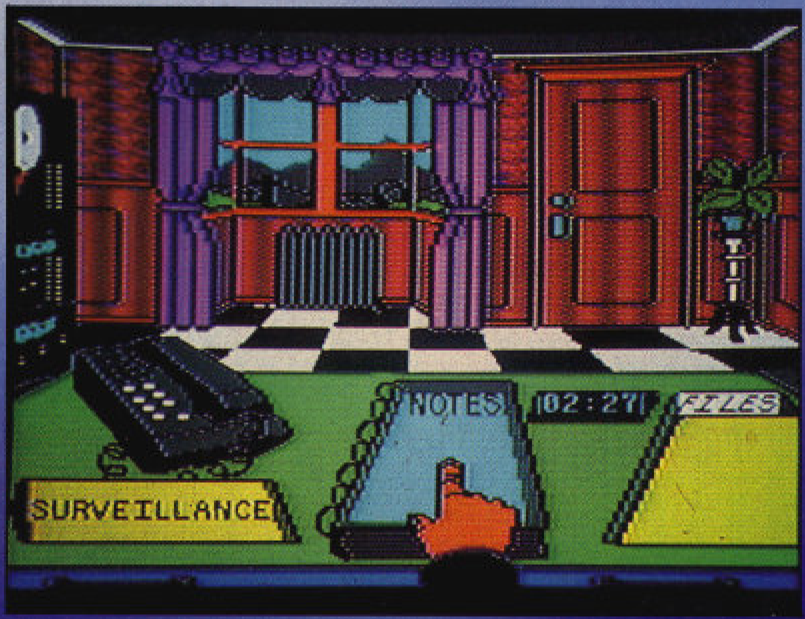
GAME OF THE MONTH

Killed Until Dead

Getting fed up of watching Agatha Christie and Dorothy Sayers mysteries on the box? Have a go at the latest Accolade game and see how hard it really is to be a super sleuth.

By Anthony Heath





Five of the world's top crime writers are gathered at the Gargoyle Hotel for a festival of murder and mayhem. You are Hercule Holmes, the world's greatest detective and it's your job to prevent one of the writers committing murder.

A total of 21 cases are included in Accolade's whodunnit thriller to give you the toughest challenge of your career. Like the other Accolade games, such as *Hardball* and *Psi-5 Trading Company*, the game oozes quality with animated graphics and joystick controls to steer the sleuthing. Your first case opens with a scene of your desktop. In front of you are your files on each of the main suspects, an electronic notebook to record your findings, a phone to call up and question the five members of the Midnight Murder Club and your surveillance team that allows you to break into suspects' rooms, and monitor and tape conversations in the hotel's rooms. One thing is certain that in just 12 hours, at midnight, someone will be killed until dead.

A quick flip through your files will reveal the main characteristics of the infamous five and a few snippets that may or may not be important in the case. For example, will it help you to track down the murderer, his or her intended victim, the weapon, location and motive if you know that Sydney Meanstreet has more chins than the Hong Kong phonebook, or that Claudia Von Bulow is a part-time clairvoyant, Lord Peter Flimsey was a spectator on the playing fields of Eton, Agatha Maypole wrote the play the Lemming Trap or that Mike Stammer's favourite hobby is cleaning guns. This information may highlight some differences and conflicts but will they lead to murder?

The investigation proper gets underway as you attempt to break in to the suspects room to look for clues. To get into a room they have to be out and you have to correctly answer a murder mystery trivia question. These only have four possible answers so if you get it wrong you'll have more

chances next time. Unfortunately, you'll have to wait 10 game minutes to try again as a guard is hanging around the door. Inside the room you'll find the odd clue mixed with a healthy helping of red herrings and perhaps a note the suspect has made about the time and place of a meeting.

Now you must either monitor these meetings yourself or set up your tape surveillance to record them and gather more clues from their conversations. At last, you should be on the trail and it's time to question the suspects. Murder suspects aren't particularly chatty folk and so you must shock them into talking to you by selecting the correct fact about them from the list of four presented to you. Get it right (you'll probably discover the sordid details from the break in) and you can ask key questions about who they think is in danger, who is the killer, where the murder will take place and what the weapon will be. You can tell whether you're on the right track by the suspects reaction. If they get worried, then you should start listening. Keep the pressure on and you could find the solution. Finally, you should consult your notes that keep track of break ins, phone conversations, recorded meetings and random tip offs and then confront the would be kiler with the facts and the most likely motive and another case will be solved.

Unfortunately, it isn't that easy. In the harder cases some suspects know nothing at all, others lie and in one case I had calculated that Agatha was about to be gunned down because she had absconded with the proceeds from a contract, only to find that she gave the money back just before I was about to make my triumphant accusation. By this time it was too late to track down the real killer and the



doomed victim.

Five candidates for both murderer and victim, five weapons and nine locations provide plenty of permutations for the mysteries so it's unlikely you'll solve any by chance and ensure it'll keep you sleuthing to the very last case. YC

Touchline

***Title:** Killed Until Dead.* ***Supplier:** Accolade (US Gold), Units 2/3, Holford Way, Holford, Birmingham B6 7AX.* ***Tel:** 021 356 3388.*

***Originality:** 8/10.* ***Graphics:** 8/10.* ***Playability:** 10/10.* ***Value:** 9/10.*

Utility Commands

This program supplies 128 users with many of the vital commands missing from Basic 7.0.

By Nagi Kanafani

When I first acquired my Commodore 128 with its great Basic 7.0, I thought that this was the Basic interpreter I had been looking for (compared to my old C64 Basic). However, studying the various commands and all their options, I discovered that Commodore had missed a small section of commands which are indispensable to the programmer. For example, the FIND routine which is very important in some programs, was excluded. Also omitted was the MERGE routine to combine programs from disk, not forgetting the OLD, sometimes known as the UNNEW routine. And last but not least, that unknown RKILL command which compresses your program by deleting all unnecessary spaces and REMarks.

Since all these valuable commands were not included, the only thing left for me to do was to write them myself. I have actually managed to write a program which doesn't interfere with my Basic program, while still being active all of the time.

Of course it had to be in machine code but it also had to be accessible as a Basic command. I used the ERROR VECTOR which is located at $0300 and pointed it to my own routine, which then checks the INPUT BUFFER at $0200 if one of my commands has been entered. If not it simply returns to the original ROM routine and outputs the error. If one of the new commands has been typed then control is passed to the correct routine.

In Detail

Let's get down to details. When control is passed to the FIND routine, it first checks if there is any string given for which it should search, if not the routine outputs SYNTAX ERROR. If the string is given, then the routine compares the program to the string and, if it is found, the line is listed. The Syntax for FIND is:

FIND <statement> – for strings which are not in quotes and
FIND " <statement> – for strings which are in quotes.

Note: Anything which is after the first quote is included in the statement even if it is a quote.

When you are searching you can use a 'wildcard' if you don't know what character should come in that place or if you are searching for different words. The 'wildcard' cannot be used in commands since these are tokenised. The 'wildcard' is usually the left arrow key but it can be changed to

any other character in the Basic Loader or in the Assembler/Editor listing.

Here are some examples:

FIND GETKEY:	finds all occurences of the GETKEY command.
FIND A$:	finds all occurences of the variable A$.
FIND "BASIC:	finds all occurences of the word BASIC in quotes.
FIND A $:	finds all occurences of any string-variable that starts with an A; eg: AA$, A1$, Al$, A8$.
FIND "H LL:	Finds all occurences of words in quotes like 'HELLO', 'HALLO', 'HILLY', etc.

The MERGE routine also checks the INPUT BUFFER for a name if it is not given or it is given a wrong syntax, then the corresponding error is printed. The routine works by reading in one line at a time, storing it in the INPUT BUFFER and then using the ROM routine to insert the line into your correct program. In other words the routine acts as if lines are inputted from the keyboard, but reads them from disk. Syntax of the MERGE command is:

MERGE " <filename> "

Note: The second quote does not have to be entered. The length of the filename must not exceed 16 characters.

Examples:

MERGE "SETUP": merge the file 'SETUP'.
MERGE "*: merge the first file on disk.

The easiest command is OLD. When this routine is executed the pointers at the beginning of the Basic program, which are set to zero after a NEW command, are set to a non zero number. Then a ROM routine is used to rechain all the Basic program. The end of the program is calculated and then a CLR is performed. The syntax is:

OLD

Note: No parameters are needed!

Now comes the RKILL command. This routine, like the MERGE routine, takes quite a lot of time to finish. This is because the whole Basic program is re-entered by using the same ROM routines as the MERGE command. All the unnecessary spaces and REMarks are deleted out of the line and it is then entered. Its syntax is:

RKILL

Note: No parameters are needed!

Entering The Program

I have included two listings. One is a Basic loader and the other is an assembler/editor listing.

In the Basic loader the machine code is entered as DATA statements and, at the end of each line, there is a checksum which should prevent typing mistakes.

First you are asked to enter the start location where the program should reside. It is usually located at $1300 through $16BE. This is memory that the Basic Interpreter doesn't use and unless you are certain that there is enough space elsewhere (approximately $03BE bytes), the start location shouldn't be changed.

If, however, the program is redirected to another memory location, the Basic loader repoints all vectors to the correct location. You are then asked if you want to change the 'wildcard' (used by FIND) and whether you want to retitle the commands.

The Basic loader then asks you if you want to save it. If yes, then enter the filename you want to use. When you have a copy of the machine code on disk you can load and initialise it immediately with the BOOT command (enter BOOT" < filename > ").

The assembler/editor listing is for use with the assembler program found in *Your Commodore* July/September 1987 issues called Assembler 128. I have included many remarks in that listing for any advanced programmers.

YC

PROGRAM: UTILITY COMMANDS

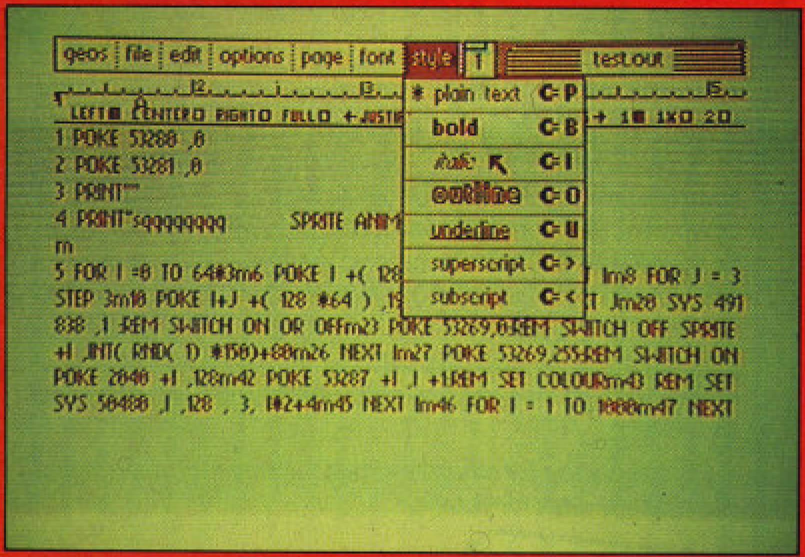
```
10 PRINT"[CLEAR]";CHR$(14);"
          [s U][s T][s I][s L][
s I][s T][s Y] [s C][s O][s M][s
 M][s A][s N][s D][s S]"
20 PRINT"[DOWN]              WRITT
EN BY [s N].[s K][s A][s N][s A]
[s F][s A][s N][s I]"
30 PRINT"[DOWN][DOWN][DOWN][DOWN
]"
40 INPUT "[s E]NTER [s S]TART [s
 L]OCATION [RIGHT][RIGHT]1300[LE
FT][LEFT][LEFT][LEFT][LEFT][LEFT
]";LOC$
50 PRINT"[s A]RE YOU SURE THERE
IS ENOUGH SPACE (Y/N) ?"
60 GETKEYA$:IFA$="N"THENRUN
70 IFA$<>"Y"THEN60
80 PRINT"[s Y]"
90 LOC=DEC(LOC$):DEST=LOC+DEC("0
3C0")
100 FORI=0 TO 63:CK=0
110 FORI2=0TO14:READA:POKE LOC+I
2+I*15,A:CK=CK+A:NEXT
120 READA:IFCK<>A THEN PRINT"[s
E]RROR IN LINE"1000+I*10:END
130 PRINT"[s L]INE"1000+I*10"  O
K"
140 NEXT
150 IF LOC=DEC("1300")THEN620
160 REM SET JUMPS AND POINTERS T
O CORRECT LOCATION
170 H=INT(LOC/256):L=LOC-H*256
180 POKE DEC("0D")+LOC,L+DEC("17
")
190 POKE DEC("0F")+LOC,H
200 POKE DEC("25")+LOC,L+DEC("44
")
210 POKE DEC("26")+LOC,H
220 POKE DEC("2A")+LOC,L+DEC("4B
")
230 POKE DEC("2B")+LOC,H
240 POKE DEC("2F")+LOC,L+DEC("52
")
250 POKE DEC("30")+LOC,H
260 POKE DEC("34")+LOC,L+DEC("59
")
270 POKE DEC("35")+LOC,H
280 POKE DEC("45")+LOC,L+DEC("A9
")
290 POKE DEC("47")+LOC,H+DEC("03
")
300 POKE DEC("4C")+LOC,L+DEC("AE
")
310 POKE DEC("4E")+LOC,H+DEC("03
")
320 POKE DEC("53")+LOC,L+DEC("B4
")
330 POKE DEC("55")+LOC,H+DEC("03
")
340 POKE DEC("5A")+LOC,L+DEC("B8
")
350 POKE DEC("5C")+LOC,H+DEC("03
")
360 POKE DEC("61")+LOC,L+DEC("88
")
370 POKE DEC("62")+LOC,H+DEC("00
")
380 POKE DEC("64")+LOC,L+DEC("62
")
390 POKE DEC("65")+LOC,H+DEC("02
")
400 POKE DEC("67")+LOC,L+DEC("D0
")
410 POKE DEC("68")+LOC,H+DEC("02
")
420 POKE DEC("6A")+LOC,L+DEC("F9
")
430 POKE DEC("6B")+LOC,H+DEC("02
")
440 POKE DEC("17E")+LOC,L+DEC("8
D")
```

```
450 POKE DEC("17F")+LOC,H+DEC("0
0")
460 POKE DEC("1F8")+LOC,L+DEC("9
0")
470 POKE DEC("1FD")+LOC,H+DEC("0
2")
480 POKE DEC("202")+LOC,L+DEC("6
2")
490 POKE DEC("207")+LOC,H+DEC("0
2")
500 POKE DEC("28B")+LOC,L+DEC("9
1")
510 POKE DEC("28C")+LOC,H+DEC("0
2")
520 POKE DEC("28E")+LOC,L+DEC("D
A")
530 POKE DEC("28F")+LOC,H+DEC("0
0")
540 POKE DEC("2F7")+LOC,L+DEC("D
A")
550 POKE DEC("2F8")+LOC,H+DEC("0
0")
560 POKE DEC("3A7")+LOC,L+DEC("D
A")
570 POKE DEC("3A8")+LOC,H+DEC("0
0")
580 POKE DEC("30C")+LOC,L+DEC("1
A")
590 POKE DEC("30E")+LOC,H+DEC("0
3")
600 POKE DEC("38C")+LOC,L+DEC("5
5")
610 POKE DEC("38D")+LOC,H+DEC("0
2")
620 PRINT"[DOWN][DOWN][s D]O YOU
 WANT TO RENAME [s C]OMMANDS (Y/
N)?"
630 GETKEYA$:IFA$="N"THENPRINT"[
s N]":GOTO860
640 IF A$<>"Y"THEN630
650 PRINT"[s Y]"
660 INPUT "[s N]EW NAME FOR 'FIN
D' [RIGHT][RIGHT]FIND[LEFT][LEFT
][LEFT][LEFT][LEFT][LEFT]";F$
670 INPUT "[s N]EW NAME FOR 'MER
GE' [RIGHT][RIGHT]MERGE[LEFT][LE
FT][LEFT][LEFT][LEFT][LEFT][LEFT
]";M$
680 INPUT "[s N]EW NAME FOR 'OLD
' [RIGHT][RIGHT]OLD[LEFT][LEFT][
LEFT][LEFT][LEFT]";O$
690 INPUT "[s N]EW NAME FOR 'RKI
LL' [RIGHT][RIGHT]RKILL[LEFT][LE
FT][LEFT][LEFT][LEFT][LEFT][LEFT
]";R$
700 SA=DEC("03A9")+LOC
710 A$=F$:GOSUB820
720 POKE DEC("4C")+LOC,SL
730 POKE DEC("4E")+LOC,SH
740 A$=M$:GOSUB820
750 POKE DEC("53")+LOC,SL
760 POKE DEC("55")+LOC,SH
770 A$=O$:GOSUB820
780 POKE DEC("5A")+LOC,SL
790 POKE DEC("5C")+LOC,SH
800 A$=R$:GOSUB820
810 DEST=SA+1:GOTO860
820 FORI=1TOLEN(A$):POKEI+SA-1,M
ID$(A$,I,1):NEXT
830 SA=SA+LEN(A$):POKESA,0
840 SH=INT(SA/256):SL=SA-SH*256
850 RETURN
860 PRINT"[DOWN][s D]O YOU WANT
TO REDEFINE THE WILCARD (Y/N)?"
870 GETKEYA$:IFA$="N"THENPRINT"[
s N]":GOTO920
880 IFA$<>"Y"THEN870
890 PRINT"[s Y]"
900 INPUT"[s E]NTER NEW CHARACTE
R ";W$
910 POKE DEC("010E")+LOC,ASC(W$)
920 PRINT"[DOWN][s D]O YOU WANT
TO SAVE TO DISK (Y/N)?"
930 GETKEYA$:IFA$="N"THEN990
940 IFA$<>"Y"THEN930
950 PRINT"Y"
960 FN$="":INPUT"[s F]ILENAME ";
FN$
970 IFLEN(FN$)<=0ORLEN(FN$)>16TH
ENGOTO960
980 BSAVE (FN$),U8,B15,P(LOC) TO
 P(DEST)
990 PRINT"FINISHED !":END
1000 DATA173,0,3,172,1,3,141,228
,3,140,229,3,169,23,160,1448
1010 DATA19,141,0,3,140,1,3,96,1
41,253,3,142,254,3,140,1339
1020 DATA255,3,165,127,208,20,32
,68,19,240,55,32,75,19,240,1558
1030 DATA53,32,82,19,240,51,32,8
9,19,240,49,173,253,3,174,1509
1040 DATA254,3,172,255,3,108,228
,3,162,169,160,22,24,144,33,1740
1050 DATA162,174,160,22,24,144,2
6,162,180,160,22,24,144,19,162,1
585
1060 DATA184,160,22,24,144,12,76
,136,19,76,98,20,76,208,21,1276
1070 DATA76,249,21,134,251,132,2
52,160,255,200,177,251,240,8,217
,2623
1080 DATA0,2,240,246,169,1,96,19
2,0,240,249,152,170,169,0,1926
1090 DATA96,189,0,2,208,10,169,0
,141,0,255,162,11,108,228,1579
1100 DATA3,201,32,208,1,232,189,
0,2,201,34,208,8,169,255,1743
1110 DATA133,254,232,24,144,4,16
9,0,133,254,160,0,189,0,2,1698
1120 DATA153,0,2,240,5,200,232,2
4,144,243,165,45,166,46,133,1798
1130 DATA251,134,252,165,213,201
,63,240,14,169,63,141,0,255,160,
2321
1140 DATA0,177,251,200,17,251,20
8,10,169,0,141,0,255,162,128,196
9
1150 DATA108,228,3,160,4,165,17,
141,230,3,169,0,133,17,177,1555
1160 DATA251,240,54,201,34,208,9
,165,17,73,255,133,17,24,144,182
5
1170 DATA36,166,254,228,17,208,3
0,162,0,189,0,2,240,43,201,1776
1180 DATA95,240,4,209,251,208,6,
232,200,208,239,240,14,224,0,237
0
1190 DATA240,5,135,202,24,144,24
7,200,240,2,208,198,160,0,177,21
83
1200 DATA251,170,200,177,251,134
,251,133,252,24,144,142,160,2,17
7,2468
1210 DATA251,170,200,177,251,160
,0,140,0,255,164,251,132,97,164,
2412
1220 DATA252,132,98,32,35,81,169
,0,141,0,255,169,13,32,210,1619
1230 DATA255,169,63,141,0,255,24
,144,199,189,0,2,208,10,169,1828
1240 DATA0,141,0,255,162,8,108,2
28,3,189,0,2,201,34,240,1571
1250 DATA8,232,201,32,240,244,76
,141,19,160,255,232,200,189,0,22
29
1260 DATA2,240,24,201,34,240,20,
192,17,176,6,153,0,1,24,1330
1270 DATA144,235,169,0,141,0,255
,162,23,108,228,3,192,0,240,1900
1280 DATA194,169,0,141,0,255,152
,162,0,160,1,32,189,255,169,1879
1290 DATA2,162,8,160,0,32,186,25
5,169,0,162,0,32,104,255,1527
1300 DATA32,125,255,13,77,69,82,
71,73,78,71,32,0,32,33,1043
1310 DATA245,32,125,255,13,0,173
,2,3,141,230,3,173,3,3,1401
1320 DATA141,231,3,173,44,3,141,
232,3,173,45,3,141,233,3,1569
1330 DATA32,192,255,162,2,32,198
,255,169,144,141,44,3,169,21,181
9
1340 DATA141,45,3,169,98,141,2,3
,169,21,141,3,3,32,207,1178
1350 DATA255,32,207,255,169,0,14
1,0,255,32,207,255,133,22,32,199
5
1360 DATA207,255,133,23,5,22,240
,65,165,144,208,61,32,207,255,20
22
1370 DATA133,22,32,207,255,133,2
3,160,0,32,207,255,153,0,2,1614
1380 DATA166,213,224,63,240,37,2
00,201,0,208,239,132,13,169,0,21
05
1390 DATA153,0,2,200,192,162,208
,248,165,144,208,16,164,13,169,2
044
1400 DATA0,133,61,169,2,133,62,7
6,234,77,24,144,172,169,0,1456
1410 DATA141,0,255,173,230,3,141
,2,3,173,231,3,141,3,3,1502
1420 DATA173,232,3,141,44,3,173,
233,3,141,45,3,169,2,32,1397
1430 DATA195,255,32,204,255,32,1
45,21,76,218,19,96,169,0,170,188
7
1440 DATA168,141,0,255,32,189,25
5,169,15,162,8,168,32,186,255,20
35
1450 DATA32,192,255,32,125,255,1
8,0,162,15,32,198,255,32,207,181
0
1460 DATA255,72,165,144,208,7,10
4,32,210,255,24,144,241,104,169,
2134
1470 DATA15,32,195,255,32,125,25
5,146,13,0,169,0,76,198,255,1766
1480 DATA169,63,141,0,255,169,25
5,160,1,145,45,169,0,141,0,1713
1490 DATA255,32,79,79,24,165,36,
164,37,105,2,144,1,200,141,1464
1500 DATA16,18,140,17,18,32,250,
81,76,218,19,169,255,133,22,1464
1510 DATA133,23,173,2,3,174,3,3,
141,230,3,142,231,3,169,1433
1520 DATA26,162,22,141,2,3,142,3
,3,165,17,141,232,3,230,1292
1530 DATA22,208,2,230,23,169,0,1
41,0,255,32,100,80,169,63,1494
1540 DATA141,0,255,160,0,177,97,
200,17,97,240,95,200,177,97,1953
1550 DATA133,22,200,177,97,133,2
3,162,0,134,17,200,177,97,240,18
12
1560 DATA44,201,34,208,8,165,17,
73,255,133,17,169,34,36,17,1411
1570 DATA48,53,201,32,240,231,20
1,143,208,45,224,0,208,7,157,199
8
1580 DATA0,2,232,24,144,9,202,18
9,0,2,201,58,240,1,232,1536
1590 DATA202,138,168,169,0,232,1
57,0,2,224,161,208,248,200,200,2
309
1600 DATA132,13,169,0,141,0,255,
76,85,21,157,0,2,232,24,1307
1610 DATA144,175,173,230,3,174,2
31,3,172,232,3,141,2,3,142,1828
1620 DATA3,3,132,17,76,218,19,70
,73,78,68,0,77,69,82,985
1630 DATA71,69,0,79,76,68,0,82,7
5,73,76,76,0,0,255,1000
```

GEOS Expanded

Berkely Softworks has now produced an improved version of GEOS plus some utilities packages to compliment the system. We put them through their paces and found them very impressive.

By Tony Hetherington



Writers Workshop



Desk Pack 1 – Calendar

When Californian based Berkley Softworks launched *Geos* (the *Graphic Environment Operating System*) on an unsuspecting world it was met with wild enthusiasm as C64 users basked in Mac-like icons, pull down menus and trash cans.

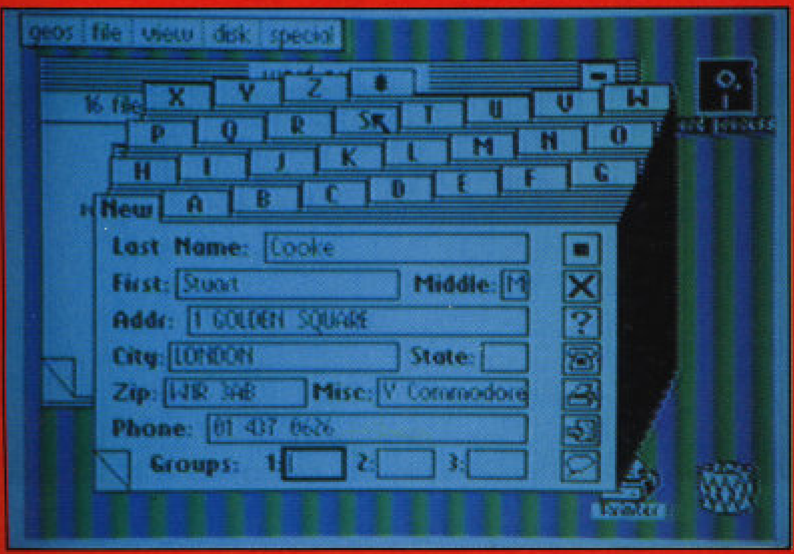
Unfortunately, the standard *Geos* disk contained only limited software to use these icons and menus and so the enthusiasm waned and *Geos* gathered dust. Was an operating system that was to be bundled with the 64C destined for obscurity as users returned to less friendly but practical programs? No! Just as all seemed lost, Berkley has released an updated version of *Geos* and three new packages to put *Geos* to work.

Writer's Workshop not only replaces the weak geoWrite with a full wordprocessor but also includes an intelligent mail merge program and text grabber so you can read documents created by other word processors. *Fontpack 1* includes 20 new fonts to liven up your letters, geoDesk adds a card index system and *Desk Pack 1* includes a graphics grabber that can "steal" Print Shop, Print Master and Newsroom artwork, an icon editor, calendar and datebook program and finally Blackjack.

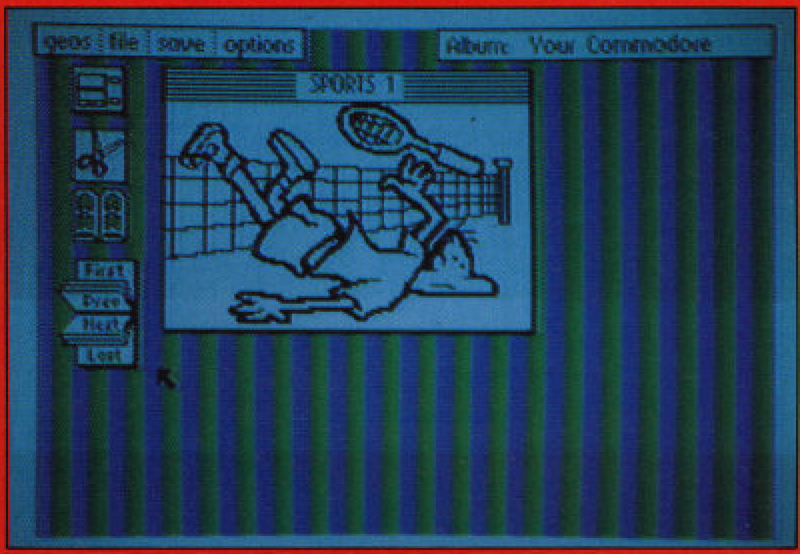
Writer's Workshop

Like all the utilities, *Writer's Workshop* is supplied on disk along with an excellent manual complete with easy to follow worked examples in a box proudly displaying Mac like screenshots. Before you can use the new utilities they must be installed on to a work disk. Installing a new program usually means copying over the file and including its icon into your work disk but for *Writer's Workshop* you must first key it into your *GEOS* master. Once this is done, the *Writer's* disk is permanently linked to the master and cannot be run without the correct master disk.

Geowrite 2.0 is a full wordprocessor that replaces the text handler included on the original *GEOS* disk. Standard word processing features such as double spacing, paragraph settings, headers and footers, search and replace, left, right and full justification as well as plain, bold, underline, italic, outline, subscript and superscript text styles are now available through pull down



Geo Dex



Graphics Grabber

menus or single key commands. However, you can also change a single word's, line's or paragraph's font or style by just clicking it. You can format paragraphs using a joystick and print some or all of a document in rough or letter quality modes.

The problem with using a new wordprocessor is that your old but still important documents are now useless as they were written by other incompatible programs. Thanks to the text grabber utility supplied on the *Workshop* disk geoWrite 2.0 becomes the "universal" wordprocessor as it can read and convert any data file into a geoWrite 2.0 document!

Using the text grabber is simple, particularly if the document you want to convert was created using either *EasyScript*, *SpeedScript* or *Paperclip*, as a menu selection completes the whole process in a few minutes. Any other C64 document can be converted but you will then have to reformat the document.

No wordprocessor would be complete without a mailmerge program to create personalised letters from a single document. GeoMerge takes this one stage further as the original document can contain IF and IF, ELSE conditions. Depending on key data held in a standard address file document, these conditions can be tested with the results printing or not printing words or sections of text.

GeoDex

The geoDex disk not only contains a copy of geoMerge but also an electronic card index system that appears in glorious 3D once the program is loaded. By clicking one of the letter tabs that are arranged at the top of the cards that record is brought to the front and can be read, edited or used to create a new record.

Each record can contain a small but useful amount of information such as the person's name, address, phone number as well as a single line for added notes.

Down the side of the cards are a series of icons that lead to other options such as geoMerge, delete records, print some or all records either as address labels or just a list of phone numbers, search for a record, view a specific group or autodial any number as long as you have a modem.

Fontpack 1

Fontpack 1 contains the files for 20 new typefaces that can be used to add a flourish of style to a geoWrite or geoPaint document.

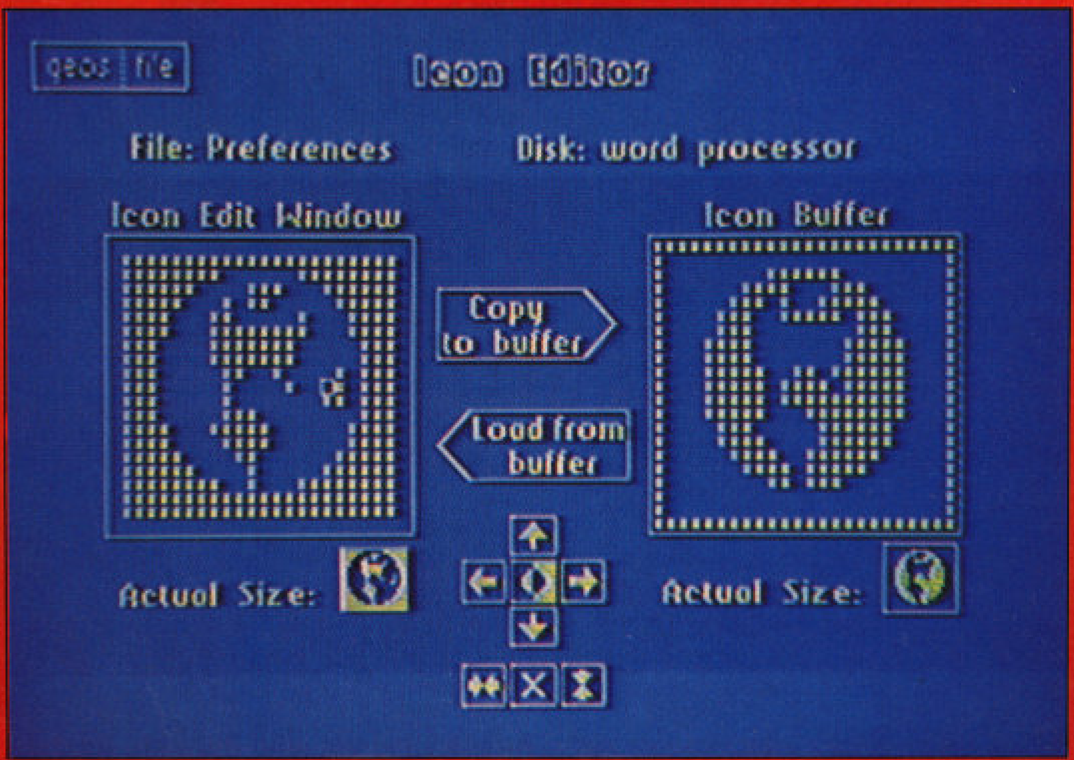
Unfortunately, *GEOS* can only use seven fonts at any one time and each one must be individually copied to a work disk. If you want a different selection of fonts you have to copy others over to your work and re-arrange the desktop so that the seven you need appear before those you don't want.

Desk Pack 1

This pack of utilities contains a graphics grabber, icon editor, date book and calendar program and another Mac tradition, Blackjack.

The graphics grabber is a spectacular utility that not only adds tremendously to the usefulness of

Icon Editor



GEOS but also extends the flexibility of the productivity programs *Print Shop*, *Print Master* and *Newsroom*. Although fun to use, these programs have serious restrictions limiting the positioning of graphics and size and style of text. By using the text grabber *GEOS* can "steal" any *Print Master*, *Print Shop* or *Newsroom* graphic and store it in a photo scrap or album. This can then be altered by geoPaint and used by geoWrite to create incomparable results.

The icon editor may at first sight be just a way to customise your work disk by redesigning the desk top icons but it has a more serious application. Using this utility non *GEOS* programs can be converted to *GEOS* format, given a *GEOS* header, an icon and run from the deskTop by simply clicking the icon (this is the equivalent of LOAD "*",8,1).

The datebook and calendar desktop accessories will organise you by providing a 9999 year calendar that displays a month at a time on the screen. Any important dates are not only flagged by an asterisk but also linked to a page opened in a datebook. The pages take up a full screen and can be used to store appointments and reminders.

The final program included in *Desk Pack 1* provides some light relief and is an icon driven Mac like version of *Las Vegas Blackjack*.

GEOS Updates

To add to the confusion of installation and file copying, each disk (except the fontpack) contains an updated version of the desktop (version 1.3), new input drivers to support the *Koala Pad* and some mice, although not the *Neos Mouse* bundled with the 64C, geoWrite 1.3 which is basically the original text handler with single key commands and a slightly improved version of geoPaint.

Conclusions

These three new utilities and first font pack add a new lease of life to the Mac-like operating system *GEOS*. Although each pack has something new to offer I found the text and graphics grabbers to be the most useful and may be enough to persuade C64 owners to convert totally to *GEOS*. This is helped by the inclusion of a full wordprocessor in geoWrite 2.0, the added IF and IF, ELSE conditions possible in geoMerge and the icon editor that converts programs so they can be run from the *GEOS* desktop.

There's more to come, as London based First Analytical is set to continue its enthusiastic support for the system that should have been the official C64 operating system. Apart from an 80 column C128 version future releases include a 28,000 cell spreadsheet program called geoCalc and geoFile which supplies *GEOS* with a full database program.

The latest version of *GEOS* (1.3) costs £49.95 with *Writer's Workshop* a reasonable £37.50, *Desk Pack 1* £26.50 and finally, the 20 new fonts in *Font Pack 1* will cost £23.50. YC

Touchline
*First Analytical Ltd: 70 Borough High Street, London Bridge, London SE1 1XF. **Tel:** 01 403 5493.*



Byting into the 6510

Moving deeper into machine code programming we get things started by creating a loop and find out how the 6510 makes decisions.

By Burghard-Henry Lehmann

Computers have established themselves as valuable tools for two main reasons. Firstly, because they are able to make 'decisions' and secondly, because they can repeat operations with precision and accuracy. Therefore they are extremely good at doing the very jobs which people find tedious.

In Basic you instruct the computer to make decisions, by using the "IF... THEN" statement. A well-known method of creating a loop in Basic is the "FOR... TO... NEXT" combination of statements.

In this article, I will explain how to do both these jobs in machine code. For this purpose we continue with the program theme we started in the last article, in which we printed a character - or output it - to the screen. Now we want to do the same thing 256 times, thus filling the first quarter of the screen.

Theory

Why only the first 256 positions and not the whole screen as well?

As I have already pointed out, the 6510 is strictly an 8-bit animal, that means, most of its registers consist of eight binary bits which allow you to enter numbers only in the range from zero to 225. Put any number larger than 255 in any of its registers, and you will get an 'overflow'. That is, instead of 1000, which we would need in order to fill the whole screen, you will have only 232 in the register (1000-(3*256) =232)!

This does not mean that we can't deal at all with larger numbers on the 6510. It only means that doing so becomes a bit more involved. Therefore, I won't deal with the procedure at this point.

Task 2

Listing 1 gives you the source file which will do the task I have set.

Please note that I have added some "empty" lines - consisting only of linenumber and semicolon - and some remarks to this listing. I did this in order to introduce you from the start to good techniques of formatting assembly lines. After all, you still want to be able to understand your program in three weeks time! And since assembly listings are much more monotonous than Basic listings, it is even more important in assembly programming to acquire good programming habits. Of course, when writing a program, you will probably be far too keen to get your ideas working to concentrate on such mundane chores as formulating a remarks. But believe me, when all the excitement has died down and your dreary job is to find a bug, you will be grateful to yourself for having followed this advice!

Incidentally, in assembly listings the semicolon is used like the REM statement in Basic. It tells the assembler that what follows can be ignored.

In line 60 I call a routine in the Commodore Kernal (the second part of the operating system which starts at 57344) in order to clear the screen.

The assembly-instruction JSR stands for "Jump to SubRoutine" and is very similar to the Basic GOSUB command. We will deal with this instruction in more depth at a later stage, when we also will deal extensively with how to make use of the handy routines in the two ROMS of the C64 for your own programming purposes.

Labels

In Listing 1, I have also introduced a very important programming tool which all assemblers worth their salt allow you to use: labels.

A label is simply a name you stick on a certain variable, as you do in Basic. In line 30 I set the value "1024" (beginning of screen memory) to the label "SCREENMEM". I do this with another one of those pseudo-instructions which are only relevant to the assembler: EQU. This is short for equals, and in Basic you would do the same thing by writing a line like: SCREEN = 1024.

As in Basic most assemblers have certain rules concerning labels. A label

may not exceed a length of between six and nine characters (depending upon the particular assembler you are using), a label may not start with a number, the characters afterwards may not contain certain graphic characters and some assemblers do not allow you to use op-code mnemonics or pseudo-instructions within a label.

But the most important rule is, that a label may not be used twice. This makes sense, because you can't expect the assembler to assign different values to identical labels in the "eeny, meeny, miny, mo" fashion.

Labels As Jump-Values

There is an even more useful way in which labels in assembly language programming are employed.

Some Basic dialects (but not the rather poor Basic on C64) allow you to write a line, like: GOTO PRINTROUTINE. In this case "PRINTROUTINE" is the name for a variable which you have to declare, just like any other variable, at the beginning of your program with a line, like: LET PRINTROUTINE = 1000.

This is then processed like any other variable, and when the Basic interpreter arrives at the GOTO line, it finds the value 1000, takes it as a line number and jumps to it.

Now, as we have learned in the last article, the microprocessor does not deal in line numbers. Instead it deals in memory locations which it keeps track of in its program counter. In assembly listings we use line numbers only for our own benefit, to make our listings more structured, and for the benefit of the screen editor of the assembler program, so that it can insert or delete lines.

In machine code we tell the microprocessor to jump or branch to a certain location, and the assembler allows us to declare that location on the left hand side of the assembly listing in the form of a label.

And here an assembler makes life really easy for us: In line 90 I have declared the label PRINTLOOP by throwing it out on the left hand side. I do not necessarily know which location the following instruction is at – unless I go to all the trouble of counting it out. But there is no need for that because I have set the overall start loction in the first line to 49152, and this is all that's needed. The assembler does the rest.

When it comes to the label PRINTLOOP, it will take the current location address, which it has arrived at by assembling the preceding lines, set it to the label PRINTLOOP and store the label and its value in a special area of memory, called the symbol table.

Then it goes on assembling as usual, until it comes to line 140 in our program. There it finds a branch-instruction (more about this later) and a label which it will promptly identify as the label which it previously has stored in the symbol table. Now all it has to do is to recover the value and write that as the jump – or branch – destination into the next location, and the microprocessor will know, where to jump to.

All this time we were on easy street. We did not have to remember yet another number. We did not even have to calculate that number! Instead we were able to use a nice, memorable word of our own choice, which even serves us as a sort of remark!

Compare that with the unstructured ways of most Basic dialects, and you will understand why yours truly prefers to program in assembly language!

Index Registers

In line 80 of Listing 1 we are introduced to the X-register which is the second of the three programmable registers of the 6510. The third is the Y-register. Both the X-register and the Y-register are called index registers and are used in similar ways.

Like the A-register or accumulator the index registers are 8-bit registers, that is, they are able to hold numbers in the range of zero to 255. But unlike the A-register, the index registers are not used for adding or subtracting numbers. In fact, all you can do with them, besides loading or unloading them, is increment or decrement their contents by one. This makes them quite unsuitable for arithmetical operations. Instead the index registers are used as a kind of moving pointer, which allows the programmer to define the input or output addresses in a flexible way.

But instead of confusing you with more clever definitions, let's look again at the listing of our program example:

In line 80 I load the X-register with zero, using a similar input instruction to the LDA instruction which we have introduced in the last article. LDX stands for Load the X-register with...

Our taks is, as you will remember, to print some "A"s at the first 256 positions of the screen. We could do this job the hard way by making use of what we have learned already and writing a program something like this:

```
10 LDA  1
20 STA 1024
30 STA 1025
40 STA 1026
etc.
```

This is of course an absurdly laborious way of doing it and would require 256 lines of assembly in order to fill the 256 screen positions.

You may already have an inkling of what the answer to our problem might be – at least in Basic. We have to construct some kind of loop which starts off with 1024 and increments this value by one with each pass through the loop.

This is where the X- or index register comes in. In line 80, the X-register is loaded with zero. Then the loop is entered, which we may name after the label PRINTLOOP.

In line 90, the A-register is loaded with one, which stands of course for the letter "A". This needs to be output to the screen memory locations, starting from 1024 (here described with the label SCREENMEMORY).

The X after the comma stands for the X-register, and if you substitute that comma in your mind for a +, you know at once, what this construction is all about. We instruct the microprocessor to add the value in the X-register to the absolute address given after STA. And since the value in the X-register at this point is zero, the microprocessor will arrive at the location 1024+0=1024.

In line 130, the X-register is incremented by one, using the very simple instruction INX, which stands for INcrement the contents of the X-register (by one)".

In line 140, the "PRINTLOOP" is closed by using a conditional branch instruction (more about this in a minute), which has in this example, a very similar effect to the Basic command: IF X< >0 THEN GOTO 90.

The program now loops back to line 90. In line 100, the contents of the

X-register are again added to the value 1024, which is hiding behind the label SCREENMEM. And since the X-register now contains one, the microprocessor calculates the output address as 1024+1=1025. Result: it outputs the letter A to the next screen position.

The confusing bit of the instruction STA SCREENMEM,X for the novice is the comma after SCREENMEM. Above I suggested for clarification to substitute this comma in your mind with a plus sign. This brings us to the question: why can't a plus sign be used in the first place?

There are indeed occasions where you use a plus sign, but this, even though serving a similar function, constitutes a different situation, as far as the assembler is concerned: LDA SCREENMEM,X is to be translated into a full-blown machine code instruction which the microprocessor will calculate, as I have described above, and then execute.

On the other hand, LDA SCREENMEM+1, for example, which is quite legitimate with most assemblers, will in practice be treated differently. It will be calculated by the assembler and not by the microprocessor. All the microprocessor will get, is 1025 and before that the op-code 141, and that, as you will recognise from the assembler listing I gave you in the last article, is good old absolute addressing.

In the next two lines(110 and 120) a similar command with the colour memory makes the "A"s visible on the screen for those of you who, like myself, still have the old ROM.

Branch-Instructions

In line 140 we close our loop by using a so-called relative branch-instruction.

BNE stands for "Branch if Not Equal" and is a sort of GOTO combined with an IF... THEN instruction. As a matter of fact, in Basic you might put the whole thing in a line like this: IF X< >0 THEN GOTO...

"Relative" means, that the length of the jump and the direction is defined in rather a special way. Instead of giving the full destination address to the microprocessor, the distance between the branch-instruction and the destination, where the branch is going to, is given in bytes.

In our program this distance is 13 bytes long, and that includes the branch-instruction itself, since the program counter of the 6510 is always pointing at the next instruction (in our case RTS) when the whole instruction is executed.

And since we have to branch (or jump) backwards this is subtracted from 256, giving 243. This is called a negative number in machine code terms, even though, strictly speaking there are no negative numbers in machine coding. But in order to be able at least to imitate negative numbers, one uses the rather strange convention of splitting the available 256 numbers in a byte into two and calls number zero to 127 positive and numbers 128 to 255 negative.

These conventions are rather confusing to the novice, because at school we all learned that a negative number has a minus sign in front of it. Now we learn that it is a number larger than 127.

What's it all about?

When we learned algebra at school, we dealt with negative and positive numbers of any size, that is numbers in the range of minus infinity to plus infinity. Such a range is impractical for an 8-bit microprocessor which can only deal with numbers in the range of zero to 255 (even though by programming it the right way, you can make it deal with practically any number, positive as well as negative).

And since a microprocessor hasn't got a register that shows if a number is positive or negative (that would be a waste of valuable ship-space), we now have to learn the convention that under certain circumstances, quite arbitrarily, numbers in the range of zero to 127 are said to be positive, while numbers in the range of 128 to 255 are said to be negative. Just because it suits micro-technology.

As far as our branch-instructions are concerned, this means of course, that they are limited to 128 byte jumps either way. If you want to jump any further than that, you have to use a combination of a relative branch instruction and an absolute jump-instruction, which allows you to jump from anywhere to anywhere in the computer.

Since these jump-instructions are so simple, we might as well include them there: JMP 50000, for example, stands for "JUMP to location 50000".

But why use relative branch instructions at all and not absolute jumps, as described above?

Relative jumps need only two bytes to give the instruction (the instruction itself and the "offset", as it is called, which requires only one byte), while absolute jumps require three bytes (instruction plus low byte plus high byte).

Computers like the C64 haven't got an unlimited amount of RAM, and in a very long machine code program those saved bytes add up very quickly, as you will find out.

Furthermore, if you want a jump with a condition attached to it, the 6510, ever the simple creature, does not support any conditional absolute jumps.

The Processor Status Register

This brings me neatly to the last thing we want to deal with in this article. The conditional aspect of the branch-instruction BNE, which we've used in line 140 of our program.

The microprocessor, as we have learned, is the real computer, and must have some inbuilt facility to make decisions.

This decision-making register, if you like, is called the Processor Status Register (PS for short) or more commonly the flag register.

Strictly speaking it's not a decision-making register at all, but a sort of electronic notepad which is updated every time the 6510 has executed an instruction.

It's very simple, really: Like most registers in the 6510 the PS-register is just another location consisting of eight binary bits. Those eight binary bits make up any number in the range between zero and 255, but, unlike the other registers, the whole number isn't of any interest here. Instead the eight binary bits are treated separately and a special function is assigned to each of them.

This special function is called a flag, and like any other binary bits there are two states in which you can find a flag: It can either be set (=1) or it can be clear (=0). If the flag is set, then we say, that the condition, which is attached to this particular flag is met (Yes). If, on the other hand, the flag is clear, then we say, that the condition is not met (No).

Different flags are tied to different conditions: The most often used flag of the 6510 is the zero-flag. It tells if a result of an input or output operation or an arithmetical operation is zero or not zero.

Most of the instructions for the 6510 have an influence on the zero-flag. If, for example, you load the accumulator with zero, the zero-flag will be set, because the condition of the flag is being met. If you load the accumulator with any number in the range from one to 255, the zero-flag will be cleared, because now the condition of the flag is not met. Equally, if you subtract 10 from 10, the flag again will be set while, if you add 10 plus 10, the flag will be cleared.

The slightly confusing aspect of the zero-flag is that it is SET if the result is zero and that it is CLEAR if the result is not zero! So, remember this well!

The use of all this becomes clear in our program. We start off with the x-register containing zero, and with each pass through our loop, we increment x by one. This means of course, that the content in x is always not zero or greater than zero, and that in turn results in the program branching bact ot PRINTLOOP, because the BNE-instruction implies: "Branch, if the result is not equal, that is, if the zero-flag is not set."

The moment the zero-flag was set, the microprocessor would continue in a straight line and end up with the RTS-instruction in line 160, and that means, of course, that our program is finished.

When does x actually become zero, when we are constantly adding one to it?

It becomes zero the moment the full capacity of the 8-bit x-register has been reached. And this happens, of course, when we add 1+255=256, if you include the zero as one usually does in computers. Because then, like the mileage counter in a car, the register starts from zero again, and this means, that the zero-flag will be set, the condition of the BNE-instruction is not being met any more and the 6510 zooms straight through to the exit in line 160.

Incidentally, of the eight flag-bits in the PS-register, two are never used, and from the remaining six bits, only two (or perhaps three) are used regularly in program applications. The other three bits are only used in ever specialised applications, and it will be a long, long time, before you use any of them – if you ever do.

Finally

In Figure 1 is a list of all the op-codes I have introduced so far and their full meaning. I also add most of the op-codes concerning the x-register and the y-register. In the context of what we have dealt with in this article, the Y-register does exactly the same thing as the x-register. As a matter of fact, in Listing 1 I could have used Y instead of X.

Listing 2 gives you the Basic equivalent of our machine code program. I thought I might add this, so that you can have a practical demonstration of the difference in speed between Basic and machine code.

Next time you might be able to impress your friends even more because then we will expand on our programming theme one final step further and fill the whole screen. By then you will already have been introduced to the most widely used instructions of the 6510 and might even be able to start writing your own programs. YC

Figure 1

LDA = Load the accumulator (or A-register) with . . . (Input)
STA = Store the contents of the accumulator in . . . (Output)
LDX = Load the x-register with . . . (Input)
STX = Store the contents of the x-register in . . . (Output)
INX = Increment the contents of the x-register (by one)
DEX = Decrement the contents of the x-register (by one)
LDY = Load the Y-register with . . . (Input)
STY = Store the contents of the y-register in . . . (Output)
INY = Increment the contents of the y-register (by one)
DEY = Decrement the contents of the Y-register (by one)
JSR = Jump to Subroutine
RTS = Return from subroutine
JMP = Jump to location . . .
BNE = Branch if result is Not Equal – if the zero-flag is NOT set.

```
LISTING 1

10              ORG 49152
20   ;
30   SCREENMEM  EQU 1024
40   COLOURMEM  EQU 55296
50   ;
60              JSR $E544          ;CLEAR SCREEN
70   ;
80              LDX #0             ;START INDEX
90   PRINTLOOP  LDA #1             ;LETTER "A"
100             STA SCREENMEM,X
110             LDA #6             ;COLOUR BLUE
120             STA COLOURMEM,X
130             INX
140             BNE PRINTLOOP      ;LOOP BACK
150  ;
160             RTS                ;EXIT
```

```
LISTING 2

10 REM COMPARABLE ROUTINE IN BASIC
20 PRINT CHR$(147)
30 SC=1024: CO=55296
40 FOR N=1 TO 256
50 POKE SC,1:POKE CO,6
60 SC=SC+1: CO=CO+1
70 NEXT
```

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This Month

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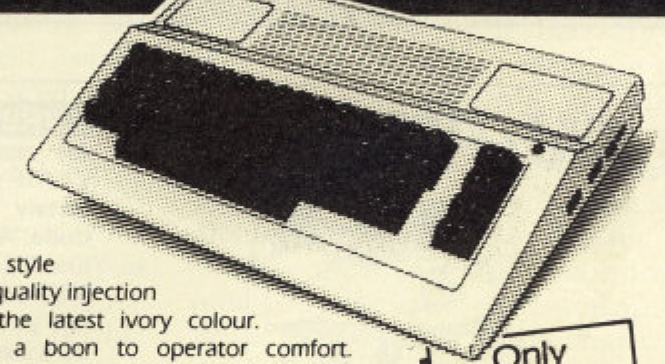
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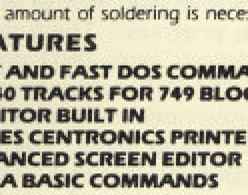


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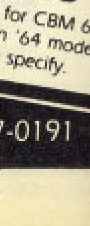
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(These figures do not allow for searching)



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THE FACTS

Almost eighteen months ago, Freeze Frame Mk I revolutionised backup methods. Since then many imitators have appeared on the market. Some of the claims being made for certain of these products are rather misleading. Let us inform you of some positive facts.

1. **Much of the new software released uses "Anti-Freeze"; only Freeze Frame and one other product can handle these.**
2. **Only Freeze Frame can automatically handle these and other programs. You don't need to be an "Expert" or need "O" levels to operate Freeze Frame.**
3. **At press date (11.2.87) our exhaustive tests were unable to find any memory resident program that both Freeze Frame Mk IV and Lazer were unable to back up, completely automatically.**
4. **Similar tests with all rival products proved disastrous.**

THESE ARE THE FACTS
(not outrageous advertising claims)

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Three cartridges in one . . . fast load, utilities and backup.

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DISC to DISC — **DISC to TAPE**

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Contributions

So you own a Commodore? So you've written some programs? So why haven't you sent them to us?

Your Commodore is always on the look out for new programs, hints and tips, articles and even regular series. In fact if you have something that you think could be of use to other Commodore owners we want to hear about it.

So if you have got something which you think we may be interested in. How do you go about submitting it to us?

Below you will find a list of guidelines that will help us to deal with any item that you send in to us. We don't expect everybody to be the next William Shakespeare but if you do follow these simple rules then it will make our job a lot easier.

1) If possible all material sent to the magazine should be typed or printed out on a computer printer.

2) All text should be double spaced i.e. there should be a blank line between each line of text. You should also leave a margin of about 10 characters around the text.

3) On the very first page you should put the following:
   Name of the article
   Machine that it is for
   Any extras required - disk, printer etc.
   Your name
   Your address
   Your telephone number

4) The top of every page should have the following information on it:
   Abbreviation of the article title
   Your name
   The page number

For example, suppose you had submitted an article on C64 interrupts. You should put something like the following at the head of the page:

Interrupts/J.Smith/1

5) Please make sure that you do not make any additional marks on your text especially underlining.

6) Try and write in clear concise English, it does not have to be a work of literature but it must be comprehensible.

7) On the bottom of each page you should put the word MORE if there are more pages to the article or ENDS if it is the last page.

8) If possible, enclose a listing of all programs.

9) Under no circumstances use a staple to hold the pages together. Use a paperclip instead.

10) Programs should be included on either disk or tape. Make sure that you SAVE two copies of every program so that we have a better chance of loading them if problems occur.

11) Programs under 10 lines can be included in the text. If your program is longer than this you must enclose a disk or cassette.

12) If your article needs any artwork then supply clear examples of what is needed. We don't expect you to be an artist but we do need to see what is required.

13) Photographs, if necessary, must be either black and white prints or colour slides. We can take shots ourselves so don't worry about this too much.

14) Submissions of any length are welcome. If you have a five line routine that you think may be of use to someone else we welcome it just as much as a full blown six part series.

15) Payment varies quite a lot and depends on quite a number of factors, such as complexity of program, presentation of program, number of magazine pages it takes up etc. Payment is generally between £10.00 and £800.00.

16) All payments are made in the month that the magazine containing your article has appeared in print.

17) If we do find your submission suitable for inclusion in the magazine we will write to you giving the terms of publication, the rate of payment and an agreement form. Prompt return of this form will allow us to use your program as soon as possible.

18) If you want the program returning to you, should we find it unsuitable for publication, then you should enclose a stamped self addressed envelope.

19) The last and most important point to make is 'get writing', we are waiting for your articles.

Plus/4 and C64 Cruncher

Speed up your programs with these handy utilities.

By William Sellers

When writing programs in Basic it is essential that you make them as easy as you possibly can. This generally means spacing your listings out, and putting in lots of REM statements etc. If you don't do this and you find a bug somewhere in your program, it's going to take you a long time to locate the error.

There are however a couple of problems with well documented programs. Firstly, the program will take up a larger amount of memory than necessary and, secondly, the program will RUN a little slower.

The two utilities printed here, one for the C64 and one for the Plus/4, will solve these problems by crunching a program down to its smallest possible size.

What Happens?

The two utilities presented here can be used to crunch your program. In effect, what the programs do, is to search through a Basic program and remove all the unnecessary spaces e.g. PRINT "HI" would become PRINT"HI". All REM statements are also removed since they aren't necessary to the running of the program. Next, the program places as many instructions on one line as it can. For example the program:

```
10 PRINT "HI"
20 PRINT "THERE"
```

would become:

```
0 PRINT"HI":PRINT"THERE"
```

Once crunched the program is renumbered. The renumber takes care of any GOTOs, GOSUBS etc.

Once the program has been crunched in this way it will not only take up far less memory but will generally RUN slightly faster than it did in its original form.

Weird Lines

It is worth pointing out that when you list a program that has been crunched some of the lines will be far greater than the 80 characters normally allowed in Commodore Basic. You must never attempt to edit a line that covers more than two screen lines since the text from the third line onwards will be lost forever. Should you need to make changes make them on your original program and then crunch it again.

Getting It In

There are two versions of the Cruncher program, one for the C64 the other for the Plus/4. I will deal with entering each program in turn.

C64 Cruncher

The program is presented here in the form of a Basic loader. You should enter this program using our SYNTAX CHECKER program that can be found on the LISTINGS page.

Once you have entered the program, SAVE it to disk or tape before running. If you are using tape, make sure that you have changed the eight to a one where indicated in the listing.

Once you have SAVEd this program out, you can then RUN it. If you have made any errors they will be indicated. Correct the program as necessary and RUN it again.

Once the program has finished it will SAVE a new program out to tape or disk called C64-CRUNCHER. This is the program that you will use in future, not the LOADER. Whenever you want to use the cruncher you should LOAD it into your computer with:

LOAD "C64-CRUNCHER",8,1 for disk
or
LOAD "C64-CRUNCHER",1,1 if using tape.

Once it has LOADed you should make sure that the program to be crunched is in memory and then activate the cruncher by typing:

```
SYS 49152
```

The amount of time taken to crunch a program depends on how large the Basic program is, so be prepared to wait a short while.

Once the program is crunched you can SAVE the new Basic program to tape or disk and use it as normal.

Plus/4 Cruncher

This version of the cruncher is a little more complicated to enter than the C64 version. There are two programs

that you must enter P4-LOADER and P4-CREATOR.

If using cassette, then make sure that you make the changes as indicated in the listing.

Cassette users should also SAVE the two programs on different cassettes. I will explain why later.

Once both programs have been entered and SAVEd you should turn OFF and ON your computer and then enter the following line:

POKE43,89:POKE44,27:POKE7000,0:NEW

Now LOAD and RUN the program P4-CREATOR.

When this program has finished working it will SAVE a new program out to tape or disk. If using tape then you should set up your cassette such that this new program will be SAVEd straight after the P4-LOADER program. This was the reason that I told you to SAVE the programs on separate tapes.

Running On The Plus/4

The program P4-CREATOR is no longer needed. To use the program all that is requred are the P4-LOADER program and the one created by the P4-CREATOR program. Should you look on your tape or disk you will find that this is called P4-CRUNCHER.

To use the program simply LOAD and RUN the program P4-LOADER. This will automatically LOAD the program P4-CRUNCHER.

Once this process is finished you can then LOAD the program that you wish to crunch into the Plus/4 and activate the cruncher with the command:

SYS DEC("1000")

Once the cruncher has finished working you can save the compacted program out to tape or disk to use normally.

Note

Don't forget you should never attempt to edit a crunched program. Always make changes to the original and then recrunch that.

PROGRAM: C64-CREATOR

```
1D 10 PRINT"[CLR]CREATING PROGRAM"
C8 20 D=49152:L=1000
CC 30 T=0
78 40 FORX=1TO8
85 50 READA:IFA=-1THEN110
66 60 POKED,A:D=D+1:T=T+A
C4 70 NEXT
F3 80 READA:IFA=-1THEN110
A6 90 IFT<>ATHENPRINT"ERROR IN LINE";L:END
47 100 L=L+10:GOTO30
CA 110 IFD<>51240+1THENPRINT"ADDRESS ERROR":END
97 120 POKE43,0:POKE44,192
6E 130 POKE45,41:POKE46,200
A8 140 PRINT"[DOWN]SAVING [RVSON]C64-CRUNCHER"
D0 150 SAVE"C64-CRUNCHER",8:END

08 160 REM CHANGE 8 TO 1 IN PREVIOUS LINE TO SAVE TO TAPE
F6 170 DATA32,37,192,32,80,199,32,46,650
B8 180 DATA192,32,177,199,32,194,197,32,1055
F5 190 DATA46,192,24,173,72,193,105,2,807
2E 200 DATA133,45,173,73,193,105,0,133,855
42 210 DATA46,32,94,166,96,169,0,133,736
DA 220 DATA253,169,206,133,254,96,32,121,1264
BA 230 DATA197,169,146,160,192,32,30,171,1097
60 240 DATA32,252,192,32,214,195,173,71,1161
31 250 DATA193,208,24,32,4,196,32,194,883
56 260 DATA192,32,137,193,32,194,192,32,1004
66 270 DATA228,193,172,70,193,32,55,194,1137
5B 280 DATA76,56,192,32,121,197,169,0,843
EF 290 DATA141,144,192,141,145,192,169,170,1294
6C 300 DATA160,192,32,30,171,32,252,192,1061
6E 310 DATA32,172,197,32,203,193,32,214,1075
42 320 DATA195,238,144,192,208,3,238,145,1363
FA 330 DATA192,172,70,193,32,55,194,173,1081
67 340 DATA71,193,240,225,32,51,165,96,1073
9D 350 DATA0,0,147,82,69,78,85,77,538
3A 360 DATA66,69,82,73,78,71,32,45,516
6E 370 DATA32,80,65,83,83,32,40,49,464
3F 380 DATA41,0,147,82,69,78,85,77,579
2C 390 DATA66,69,82,73,78,71,32,45,516
DB 400 DATA32,80,65,83,83,32,40,50,465
BD 410 DATA41,0,32,74,193,162,0,189,691
A6 420 DATA0,203,141,250,192,189,0,204,1179
86 430 DATA157,0,203,173,250,192,157,0,1132
96 440 DATA204,232,236,70,193,144,232,236,1547
6D 450 DATA251,192,144,227,173,70,193,141,1391
49 460 DATA250,192,173,251,192,141,70,193,1462
A4 470 DATA173,250,192,141,251,192,32,106,1337
FD 480 DATA193,96,0,0,32,74,193,160,748
22 490 DATA0,140,71,193,177,251,153,0,985
69 500 DATA203,200,192,2,208,246,173,0,1224
7D 510 DATA203,208,24,173,1,203,208,19,1039
50 520 DATA169,1,141,71,193,165,251,141,1132
33 530 DATA72,193,165,252,141,73,193,32,1121
D1 540 DATA106,193,96,177,251,153,0,203,1179
00 550 DATA200,192,4,208,246,177,251,153,1431
BF 560 DATA0,203,200,201,0,208,246,140,1198
A0 570 DATA70,193,32,106,193,96,0,0,690
62 580 DATA0,0,140,105,193,160,0,145,743
1E 590 DATA253,200,138,145,253,200,173,105,1467
76 600 DATA193,145,253,24,165,253,105,3,1141
E0 610 DATA133,253,165,254,105,0,133,254,1297
26 620 DATA96,0,56,165,253,233,3,133,939
BD 630 DATA253,165,254,233,0,133,254,160,1452
3C 640 DATA2,177,253,141,105,193,136,177,1184
04 650 DATA253,170,136,177,253,172,105,193,1459
D6 660 DATA96,32,74,193,32,136,197,32,792
FD 670 DATA252,192,172,70,193,32,55,194,1160
3B 680 DATA173,71,193,208,23,173,70,193,1104
50 690 DATA141,202,193,32,252,192,172,202,1386
12 700 DATA193,32,73,194,32,203,193,173,1093
BB 710 DATA71,193,240,7,32,155,197,32,927
4E 720 DATA106,193,96,172,70,193,32,55,917
BF 730 DATA194,172,202,193,32,55,194,76,1118
84 740 DATA163,193,0,32,74,193,173,70,898
CC 750 DATA193,240,13,160,0,185,0,203,994
0D 760 DATA145,251,200,204,70,193,208,245,1516
F4 770 DATA32,106,193,96,32,74,193,32,758
CD 780 DATA136,197,165,251,141,53,194,165,1302
34 790 DATA252,141,54,194,24,173,72,193,1103
38 800 DATA105,2,133,251,141,72,193,173,1070
8F 810 DATA73,193,105,0,133,252,141,73,970
3F 820 DATA193,160,0,177,251,172,70,193,1216
36 830 DATA145,251,173,54,194,197,252,208,1474
2B 840 DATA7,173,53,194,197,251,240,11,1126
8E 850 DATA165,251,208,2,198,252,198,251,1525
```

```
9C 860 DATA76,9,194,32,203,193,32,155,894
BF 870 DATA197,32,106,193,96,0,0,140,764
50 880 DATA91,194,24,165,251,109,91,194,1119
3B 890 DATA133,251,165,252,105,0,133,252,1291
B9 900 DATA96,140,91,194,56,165,251,237,1230
02 910 DATA91,194,133,251,165,252,233,0,1319
40 920 DATA133,252,96,0,32,74,193,162,942
ED 930 DATA0,160,0,142,200,194,173,127,996
07 940 DATA195,141,201,194,173,128,195,141,1368
E2 950 DATA202,194,173,127,195,141,129,195,1356
46 960 DATA173,128,195,141,130,195,189,203,1354
36 970 DATA194,141,127,195,189,207,194,141,1388
16 980 DATA128,195,32,39,195,173,200,194,1156
69 990 DATA208,10,173,129,195,240,15,169,1139
98 1000 DATA1,141,200,194,173,129,195,24,1057
88 1010 DATA105,48,153,0,203,200,232,224,1165
EE 1020 DATA4,208,199,173,127,195,24,105,1035
66 1030 DATA48,153,0,203,200,140,70,193,1007
32 1040 DATA173,201,194,141,127,195,173,202,1406
9B 1050 DATA194,141,128,195,32,106,193,96,1085
98 1060 DATA0,0,0,16,232,100,10,39,397
6F 1070 DATA3,0,0,32,74,193,169,0,471
69 1080 DATA141,127,195,141,128,195,174,70,1171
AB 1090 DATA193,160,255,202,200,189,0,203,1402
A7 1100 DATA56,233,48,141,208,195,169,0,1050
9D 1110 DATA141,209,195,185,29,195,141,210,1305
4E 1120 DATA195,185,34,195,141,211,195,32,1188
99 1130 DATA133,195,24,173,127,195,109,208,1164
24 1140 DATA195,141,127,195,173,128,195,109,1263
21 1150 DATA209,195,141,128,195,224,0,208,1300
63 1160 DATA202,32,106,193,96,1,10,100,740
DC 1170 DATA232,16,0,0,0,3,39,32,322
C2 1180 DATA74,193,160,16,169,0,141,131,884
37 1190 DATA195,141,132,195,14,129,195,46,1047
E7 1200 DATA130,195,46,131,195,46,132,195,1070
5F 1210 DATA173,132,195,205,128,195,144,36,1208
DF 1220 DATA208,8,173,131,195,205,127,195,1242
31 1230 DATA144,26,173,131,195,237,127,195,1228
F3 1240 DATA141,131,195,173,132,195,237,128,1332
92 1250 DATA195,141,132,195,238,129,195,208,1433
3D 1260 DATA3,238,130,195,136,208,197,173,1280
CE 1270 DATA131,195,141,127,195,173,132,195,1289
14 1280 DATA141,128,195,32,106,193,96,0,891
23 1290 DATA0,0,0,0,0,32,74,193,299
3C 1300 DATA160,16,169,0,141,212,195,141,1034
43 1310 DATA213,195,14,212,195,46,213,195,1283
5D 1320 DATA46,210,195,46,211,195,144,29,1076
8B 1330 DATA24,173,212,195,109,208,195,141,1257
0F 1340 DATA212,195,173,213,195,109,209,195,1501
3D 1350 DATA141,213,195,144,8,238,210,195,1344
D0 1360 DATA208,3,238,211,195,136,208,210,1409
10 1370 DATA173,212,195,141,208,195,173,213,1510
82 1380 DATA195,141,209,195,32,106,193,96,1167
09 1390 DATA0,0,0,0,0,32,74,106
C2 1400 DATA193,162,2,189,0,203,141,127,1017
79 1410 DATA195,232,189,0,203,141,128,195,1283
43 1420 DATA32,194,192,32,92,194,169,255,1160
F4 1430 DATA160,195,32,30,171,32,149,199,968
C1 1440 DATA32,194,192,32,106,193,96,19,864
35 1450 DATA17,17,17,0,32,74,193,32,382
91 1460 DATA136,197,162,0,142,117,197,142,1093
6E 1470 DATA118,197,189,0,203,157,0,205,1069
77 1480 DATA232,224,4,208,245,142,119,197,1371
F6 1490 DATA142,120,197,174,119,197,189,0,1138
8E 1500 DATA203,201,34,208,10,173,117,197,1143
F7 1510 DATA73,1,141,117,197,169,34,174,906
06 1520 DATA117,197,208,80,201,131,208,5,1147
7A 1530 DATA162,1,142,118,197,201,58,208,1087
33 1540 DATA5,162,0,142,118,197,201,143,968
E4 1550 DATA208,27,174,119,197,224,4,240,1193
4F 1560 DATA8,206,120,197,169,0,76,140,916
F0 1570 DATA196,174,120,197,157,0,205,238,1287
75 1580 DATA120,197,76,92,196,201,32,208,1122
93 1590 DATA11,174,118,197,208,6,238,119,1071
C7 1600 DATA197,76,35,196,201,137,240,52,1134
A9 1610 DATA201,140,240,48,201,141,240,44,1255
1D 1620 DATA201,167,240,40,174,120,197,157,1296
D7 1630 DATA0,205,238,119,197,238,120,197,1314
9A 1640 DATA201,0,208,135,162,0,189,0,895
51 1650 DATA205,157,0,203,232,236,120,197,1350
77 1660 DATA208,244,142,70,193,32,155,197,1241
7B 1670 DATA32,106,193,96,174,120,197,157,1075
6D 1680 DATA0,205,238,119,197,238,120,197,1314
8C 1690 DATA160,0,174,119,197,189,0,203,1042
58 1700 DATA201,32,240,12,201,48,144,14,892
CB 1710 DATA201,58,176,10,153,0,204,200,1002
0F 1720 DATA238,119,197,76,194,196,192,0,1212
F7 1730 DATA208,3,76,35,196,140,251,192,1101
C4 1740 DATA32,194,192,32,211,194,169,0,1024
E1 1750 DATA141,144,192,141,145,192,32,121,1108
8B 1760 DATA197,32,252,192,173,71,193,240,1350
C5 1770 DATA29,238,127,195,208,3,238,128,1166
AC 1780 DATA195,173,128,195,208,224,173,127,1423
90 1790 DATA195,208,219,169,255,141,144,192,1523
96 1800 DATA141,145,192,76,63,197,173,2,989
17 1810 DATA203,205,127,195,208,8,173,3,1122
09 1820 DATA203,205,128,195,240,17,238,144,1370
DA 1830 DATA192,208,3,238,145,192,172,70,1220
A5 1840 DATA193,32,55,194,76,249,196,173,1168
3C 1850 DATA144,192,141,127,195,173,145,192,1309
BC 1860 DATA141,128,195,32,92,194,160,0,942
96 1870 DATA185,0,203,174,120,197,157,0,1036
18 1880 DATA205,238,120,197,200,204,70,193,1427
AD 1890 DATA208,238,32,194,192,174,119,197,1354
2D 1900 DATA189,0,203,201,44,208,3,76,924
EF 1910 DATA180,196,76,35,196,0,0,0,683
33 1920 DATA0,32,74,193,165,43,133,251,891
60 1930 DATA165,44,133,252,32,106,193,96,1021
CE 1940 DATA32,74,193,165,251,141,153,197,1206
88 1950 DATA165,252,141,154,197,32,106,193,1240
AE 1960 DATA96,0,0,32,74,193,173,153,721
9A 1970 DATA197,133,251,173,154,197,133,252,1490
52 1980 DATA32,106,193,96,32,74,193,162,888
FA 1990 DATA2,173,144,192,157,0,203,232,1103
34 2000 DATA173,145,192,157,0,203,32,106,1008
67 2010 DATA193,96,32,121,197,169,17,160,985
21 2020 DATA198,32,30,171,32,252,192,173,1080
49 2030 DATA71,193,208,60,32,214,195,173,1146
00 2040 DATA70,193,141,38,198,32,39,198,909
67 2050 DATA173,36,198,240,9,172,70,193,1091
78 2060 DATA32,55,194,76,204,197,172,70,1000
BB 2070 DATA193,32,55,194,32,252,192,173,1123
66 2080 DATA71,193,208,20,32,214,195,32,965
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30  2090 DATA94,198,173,37,198,2
    40,3,76,1019
E8  2100 DATA215,197,32,11,199,7
    6,215,197,1142
4A  2110 DATA96,147,67,82,85,78,
    67,72,694
E2  2120 DATA73,78,71,32,80,82,7
    9,71,566
42  2130 DATA82,65,77,0,0,0,0,32
    ,256
87  2140 DATA74,193,162,4,169,0,
    141,117,860
85  2150 DATA197,141,36,198,189,
    0,203,240,1204
7E  2160 DATA33,201,34,208,11,17
    3,117,197,974
1A  2170 DATA73,1,141,117,197,76
    ,81,198,884
D9  2180 DATA172,117,197,208,4,2
    01,139,240,1278
4F  2190 DATA4,232,76,52,198,169
    ,1,141,873
D2  2200 DATA36,198,32,106,193,9
    6,32,74,767
0A  2210 DATA193,32,136,197,169,
    0,141,37,905
C4  2220 DATA198,173,2,203,141,9
    ,199,173,1098
8C  2230 DATA3,203,141,10,199,32
    ,121,197,906
30  2240 DATA32,252,192,173,71,1
    93,208,127,1248
83  2250 DATA172,70;193,32,55,19
    4,169,0,885
24  2260 DATA141,117,197,162,4,1
    89,0,203,1013
59  2270 DATA240,230,201,34,208,
    8,173,117,1211
69  2280 DATA197,73,1,141,117,19
    7,172,117,1015
A0  2290 DATA197,208,20,201,137,
    240,20,201,1224
A2  2300 DATA138,240,16,201,140,
    240,12,201,1188
15  2310 DATA141,240,8,201,167,2
    40,4,232,1233
71  2320 DATA76,141,198,160,0,23
    2,189,0,996
D2  2330 DATA203,201,48,144,11,2
    01,58,176,1042
9F  2340 DATA7,153,0,204,200,76,
    189,198,1027
AC  2350 DATA192,0,240,185,140,2
    51,192,32,1232
F4  2360 DATA194,192,32,211,194,
    32,194,192,1241
D1  2370 DATA173,127,195,205,9,1
    99,208,8,1124
E5  2380 DATA173,128,195,205,10,
    199,240,10,1160
C6  2390 DATA189,0,203,201,44,24
    0,196,76,1149
67  2400 DATA141,198,169,1,141,3
    7,198,32,917
8F  2410 DATA155,197,32,252,192,
    32,106,193,1159
CE  2420 DATA96,0,0,173,38,198,5
    6,233,794
BC  2430 DATA4,24,109,70,193,176
    ,56,160,792
77  2440 DATA1,32,73,194,160,0,1
    69,58,687
4D  2450 DATA145,251,162,4,200,1
    89,0,203,1154
62  2460 DATA145,251,232,236,70,
    193,208,244,1579
97  2470 DATA169,4,141,202,193,3
    2,74,193,1008
F9  2480 DATA32,136,197,172,70,1
    93,200,32,1032
15  2490 DATA55,194,32,163,193,1
    72,38,198,1045
B0  2500 DATA136,32,73,194,32,25
    2,192,96,1007
70  2510 DATA32,121,197,169,124,
    160,199,32,1034
0D  2520 DATA30,171,32,252,192,1
    73,71,193,1114
62  2530 DATA208,25,32,214,195,1
    73,4,203,1054
37  2540 DATA201,143,208,6,32,13
    7,193,76,996
07  2550 DATA90,199,172,70,193,3
    2,55,194,1005
B1  2560 DATA76,90,199,96,147,82
    ,69,77,836
96  2570 DATA79,86,73,78,71,32,8
    2,69,570
F6  2580 DATA77,32,83,84,65,84,6
    9,77,571
2B  2590 DATA69,78,84,83,0,32,74
    ,193,613
F4  2600 DATA174,70,193,169,13,1
    57,0,203,979
46  2610 DATA232,169,0,157,0,203
    ,169,0,930
D1  2620 DATA160,203,32,30,171,3
    2,106,193,927
CA  2630 DATA96,32,121,197,169,1
    3,160,200,988
96  2640 DATA32,30,171,32,252,19
    2,173,71,953
1A  2650 DATA193,208,73,32,214,1
    95,169,0,1084
D2  2660 DATA141,117,197,162,4,1
    89,0,203,1013
ED  2670 DATA201,34,208,8,173,11
    7,197,73,1011
09  2680 DATA1,141,117,197,232,2
    36,70,193,1187
39  2690 DATA208,235,173,117,197
    ,240,28,202,1400
B6  2700 DATA169,34,157,0,203,23
    2,169,0,964
2A  2710 DATA157,0,203,232,142,7
    0,193,32,1029
7D  2720 DATA194,192,32,137,193,
    32,194,192,1166
DB  2730 DATA32,228,193,172,70,1
    93,32,55,975
82  2740 DATA194,76,187,199,96,1
    47,67,72,1038
3D  2750 DATA69,67,75,73,78,71,3
    2,83,548
2D  2760 DATA84,82,73,78,71,32,6
    8,69,557
BE  2770 DATA76,73,77,73,84,69,8
    2,83,617
D7  2780 DATA0,-1
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PROGRAM: P4-LOADER

```
10 PRINT"[CLEAR][DOWN][DOWN]POKE
43,89:POKE44,27:POKE7000,0:NEW"
20 PRINT"[DOWN][DOWN]LOAD"CHR$(3
4)"P4-CRUNCHER"CHR$(34)",8,1"
30 PRINT"[DOWN][DOWN][DOWN][DOWN
]NEW"
40 PRINT"[HOME]";
50 POKE239,3
60 POKE1319,13:POKE1320,13:POKE1
321,13
70 NEW
```

PROGRAM: P4-CREATOR

```
10 REM MOVE THE BOTTOM OF BASIC
BEFORE LOADING THIS PROGRAM
20 REM BY TYPING  POKE43,89:POKE
44,27:POKE7000,0:NEW
30 PRINT"[CLEAR]CREATING PROGRAM
"
40 D=4096:L=1000
50 T=0
60 FORX=1TO8
70 READA:IFA=-1THEN120
80 POKED,A:D=D+1:T=T+A
90 NEXT
100 READA:IFA=-1THEN120:ELSEIFT<
>ATHENPRINT"ERROR IN LINE ";L:EN
D
110 L=L+10:GOTO50
120 IFD<>6230+1THENPRINT"ADDRESS
 ERROR":END
130 PRINT"[DOWN]SAVING [RVSON]P4
-CRUNCHER"
140 POKE43,0:POKE44,16
150 POKE45,87:POKE46,24
160 SAVE"P4-CRUNCHER",8:END
170 REM CHANGE 8 TO1 IN PREVIOUS
 LINE TO SAVE TO TAPE
180 DATA32,82,24,32,43,16,32,86,
347
190 DATA23,32,52,16,32,183,23,32
,393
200 DATA200,21,32,52,16,24,173,7
8,596
210 DATA17,105,2,133,45,173,79,1
7,571
220 DATA105,0,133,46,32,67,24,32
,439
230 DATA77,24,96,169,51,133,242,
169,961
240 DATA3,133,243,96,32,127,21,1
69,824
250 DATA152,160,16,32,47,24,32,2
,465
260 DATA17,32,220,19,173,77,17,2
08,763
270 DATA24,32,10,20,32,200,16,32
,366
280 DATA143,17,32,200,16,32,234,
17,691
290 DATA172,76,17,32,61,18,76,62
,514
300 DATA16,32,127,21,169,0,141,1
50,656
310 DATA16,141,151,16,169,176,16
0,16,845
320 DATA32,47,24,32,2,17,32,178,
364
330 DATA21,32,209,17,32,220,19,2
38,788
340 DATA150,16,208,3,238,151,16,
172,954
350 DATA76,17,32,61,18,173,77,17
,471
360 DATA240,225,32,57,24,96,0,0,
674
370 DATA147,82,69,78,85,77,66,69
,673
380 DATA82,73,78,71,32,45,32,80,
493
390 DATA65,83,83,32,40,49,41,0,3
93
400 DATA147,82,69,78,85,77,66,69
,673
410 DATA82,73,78,71,32,45,32,80,
493
420 DATA65,83,83,32,40,50,41,0,3
94
430 DATA32,80,17,162,0,189,88,24
,592
440 DATA141,0,17,189,88,25,157,8
8,705
450 DATA24,173,0,17,157,88,25,23
2,716
460 DATA236,76,17,144,232,236,1,
17,959
470 DATA144,227,173,76,17,141,0,
17,795
480 DATA173,1,17,141,76,17,173,0
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,598
490 DATA17,141,1,17,32,112,17,96
,433
500 DATA0,0,32,80,17,160,0,140,4
29
510 DATA77,17,177,208,153,88,24,
200,944
520 DATA192,2,208,246,173,88,24,
208,1141
530 DATA24,173,89,24,208,19,169,
1,707
540 DATA141,77,17,165,208,141,78
,17,844
550 DATA165,209,141,79,17,32,112
,17,772
560 DATA96,177,208,153,88,24,200
,192,1138
570 DATA4,208,246,177,208,153,88
,24,1108
580 DATA200,201,0,208,246,140,76
,17,1088
590 DATA32,112,17,96,0,0,0,0,257
600 DATA140,111,17,160,0,145,242
,200,1015
610 DATA138,145,242,200,173,111,
17,145,1171
620 DATA242,24,165,242,105,3,133
,242,1156
630 DATA165,243,105,0,133,243,96
,0,985
640 DATA56,165,242,233,3,133,242
,165,1239
650 DATA243,233,0,133,243,160,2,
177,1191
660 DATA242,141,111,17,136,177,2
42,170,1236
670 DATA136,177,242,172,111,17,9
6,32,983
680 DATA80,17,32,142,21,32,2,17,
343
690 DATA172,76,17,32,61,18,173,7
7,626
700 DATA17,208,23,173,76,17,141,
208,863
710 DATA17,32,2,17,172,208,17,32
,497
720 DATA79,18,32,209,17,173,77,1
7,622
730 DATA240,7,32,161,21,32,112,1
7,622
740 DATA96,172,76,17,32,61,18,17
2,644
750 DATA208,17,32,61,18,76,169,1
7,598
760 DATA0,32,80,17,173,76,17,240
,635
770 DATA13,160,0,185,88,24,145,2
08,823
780 DATA200,204,76,17,208,245,32
,112,1094
790 DATA17,96,32,80,17,32,142,21
,437
800 DATA165,208,141,59,18,165,20
9,141,1106
810 DATA60,18,24,173,78,17,105,2
,477
820 DATA133,208,141,78,17,173,79
,17,846
830 DATA105,0,133,209,141,79,17,
160,844
840 DATA0,177,208,172,76,17,145,
208,1003
850 DATA173,60,18,197,209,208,7,
173,1045
860 DATA59,18,197,208,240,11,165
,208,1106
870 DATA208,2,198,209,198,208,76
,15,1114
880 DATA18,32,209,17,32,161,21,3
2,522
890 DATA112,17,96,0,0,140,97,18,
480
900 DATA24,165,208,109,97,18,133
,208,962
910 DATA165,209,105,0,133,209,96
,140,1057
920 DATA97,18,56,165,208,237,97,
18,896
930 DATA133,208,165,209,233,0,13
3,209,1290
940 DATA96,0,32,80,17,162,0,160,
547
950 DATA0,142,206,18,173,133,19,
141,832
960 DATA207,18,173,134,19,141,20
8,18,918
970 DATA173,133,19,141,135,19,17
3,134,927
980 DATA19,141,136,19,189,209,18
,141,872
990 DATA133,19,189,213,18,141,13
4,19,866
1000 DATA32,45,19,173,206,18,208
,10,711
1010 DATA173,135,19,240,15,169,1
,141,893
1020 DATA206,18,173,135,19,24,10
5,48,728
1030 DATA153,88,24,200,232,224,4
,208,1133
1040 DATA199,173,133,19,24,105,4
8,153,854
1050 DATA88,24,200,140,76,17,173
,207,925
1060 DATA18,141,133,19,173,208,1
8,141,851
1070 DATA134,19,32,112,17,96,0,0
,410
1080 DATA0,16,232,100,10,39,3,0,
400
1090 DATA0,32,80,17,169,0,141,13
3,572
1100 DATA19,141,134,19,174,76,17
,160,740
1110 DATA255,202,200,189,88,24,5
6,233,1247
1120 DATA48,141,214,19,169,0,141
,215,947
1130 DATA19,185,35,19,141,216,19
,185,819
1140 DATA40,19,141,217,19,32,139
,19,626
1150 DATA24,173,133,19,109,214,1
9,141,832
1160 DATA133,19,173,134,19,109,2
15,19,821
1170 DATA141,134,19,224,0,208,20
2,32,960
1180 DATA112,17,96,1,10,100,232,
16,584
1190 DATA0,0,0,3,39,32,80,17,171
1200 DATA160,16,169,0,141,137,19
,141,783
1210 DATA138,19,14,135,19,46,136
,19,526
1220 DATA46,137,19,46,138,19,173
,138,716
1230 DATA19,205,134,19,144,36,20
8,8,773
1240 DATA173,137,19,205,133,19,1
44,26,856
1250 DATA173,137,19,237,133,19,1
41,137,996
1260 DATA19,173,138,19,237,134,1
9,141,880
1270 DATA138,19,238,135,19,208,3
,238,998
1280 DATA136,19,136,208,197,173,
137,19,1025
1290 DATA141,133,19,173,138,19,1
41,134,898
1300 DATA19,32,112,17,96,0,0,0,2
76
1310 DATA0,0,32,80,17,160,16,3
05
1320 DATA169,0,141,218,19,141,21
9,19,926
1330 DATA14,218,19,46,219,19,46,
216,797
1340 DATA19,46,217,19,144,29,24,
173,671
1350 DATA218,19,109,214,19,141,2
18,19,957
1360 DATA173,219,19,109,215,19,1
41,219,1114
1370 DATA19,144,8,238,216,19,208
,3,855
1380 DATA238,217,19,136,208,210,
173,218,1419
1390 DATA19,141,214,19,173,219,1
9,141,945
1400 DATA215,19,32,112,17,96,0,0
,491
1410 DATA0,0,0,0,32,80,17,162,29
1
1420 DATA2,189,88,24,141,133,19,
232,828
1430 DATA189,88,24,141,134,19,32
,200,827
1440 DATA16,32,98,18,169,5,160,2
0,518
1450 DATA32,47,24,32,155,23,32,2
00,545
1460 DATA16,32,112,17,96,19,17,1
7,326
1470 DATA17,0,32,80,17,32,142,21
,341
1480 DATA162,0,142,123,21,142,12
4,21,735
1490 DATA189,88,24,157,88,26,232
,224,1028
1500 DATA4,208,245,142,125,21,14
2,126,1013
1510 DATA21,174,125,21,189,88,24
,201,843
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Games Reviews

If you've got a bit of spare cash then a game is as good a way as any to use it up. Here's a selection of some of the latest software on offer.

ZONE RANGER

Even dustbin-men have got to go high-tech sometime. As more and more satellites are launched, so space itself begins to get cluttered. Throw in a few asteroids and life soon becomes hazardous for those seeking to explore the final frontier.

So it is that you take up your new appointment as a Zone Ranger. Working for the Cosmic Garbage Clearance Company, your new position is that of Orbital Debris Destruction operative.

What this means in reality is that you whizz round space blasting everything in sight for as long as possible without crashing in to one of the multitude of hazards. These include large lumps of rocks which split into two when you hit them (remember asteroids?) and the occasional satellite. There are also some lethal beams to be dodged as well.

On the plus side, you can seek temporary refuge by driving into a warp hole, gain temporary immunity from a sparkler or gain access to the Inner Sanctum where, if you can navigate through a series of passages avoiding bumpers and sliding doors, help is at hand.



Zone Ranger is a reasonable shoot-em-up, especially at the price but, written back in 1984, it is beginning to look very dated.

G.R.H.

Touchline

Title: *Zone Ranger.* ***Machine:*** *C64.* ***Supplier:*** *Firebird, Silver, Wellington House, Upper St Martins Lane, London WC2H 9DL.* ***Tel.*** *01 379 6755.* ***Price:*** *£1.99.*
Originality: *3/10.* ***Graphics:*** *4/10.* ***Playability:*** *7/10.* ***Value:*** *6/10.*

CYBORG

No one was quite sure what Avernus was or where it came from. A small asteroid, it was on a collision course with Earth. A month ago, seven astronauts were launched with the brief to go and investigate. Five days ago, radio contact was lost. All you have to do is find them, give them some extra fuel and restore the radio link.

As you leave your ship, you soon discover a lift that takes you deep under the surface of the asteroid. Codes must be gleaned to access various terminals and there are guards to be avoided. Although the initial area appears small, there is a huge warren of lifts and passages to be explored.

The display is divided up into three windows. Across the top of the screen is a 3D-ish view of your surroundings, bottom left is the information panel and bottom right the control panel. This gives you access to a range of commands such as picking up and examining objects, scanning the surrounding area, re-loading your weapon and analysing the character of anyone that you have just bumped off.

The game looks very much like a cross between Impossible Mission and Nexus but there are one or two areas where the gameplay could be improved. Positioning your man has to be very precise if you are to examine or pick up anything and I found frustration quickly setting in. The



same applies to walking into rooms and being able to walk through the bodies of your adversaries, most disconcerting. Also, all sense of action is lost everytime you access the control panel and the game freezes. The enemy stand motionless while you decide what you want to do.

The instructions included with the game are deliberately vague which is fair enough but there ought to be some escape mechanism if you blunder into something that you can't yet handle. For example, I entered one room and was examining all the objects when I logged on to a computer terminal by entering the floor code. The computer then expected some other input and refused to let me log off until I had entered it. As I did not particularly relish the idea of a few hours hacking, there was no alternative but to switch off. Game positions can be saved but again problems were encountered with the machine crashing on a couple of occasions.

Cyborg has some very nice ideas but they all seem to have been put together in the wrong order with the result that it is let down by some poor gameplay. **G.R.H.**

Touchline
Title: *Cyborg.* ***Machine:*** *C64.* ***Supplier:*** *CRL, CRL House, 9 Kings Yard, Carpenters Road, London E15 2HD. Tel: 01 533 2981.*
Originality: *7/10.* ***Graphics:*** *8/10.* ***Playability:*** *4/10.* ***Value:*** *6/10.*

ACCOLADE COLLECTION

A trio of games from Accolade's first year makes an impressive line up for a three for the price of one compilation.

For only £9.95 you can fly a space freighter packed full of to the ninth in Hardball, which is the best baseball game in town, and marshall a frontier town in Law of the West. All three games have one thing in common — they've got some of the best graphics you're ever likely to see.

Captaining a freighter on the edge of the galaxy in the 35th century isn't easy as you'll find out if you sign up for the Psi-5 Trading Company. Not only do you have to run the gauntlet of pirates plundering your precious cargo you have to rely on the robots, misfits and aliens that volunteer for your crew.

You have five positions to fill and six candidates to choose from for each post and they all have their own strengths and weaknesses. This choice is essential as they actually engineer, repair, fire weapons, navigate and scan for the ship. You just issue orders and worry a lot.

Once you're on your way you talk to the crew through duckshoot menus, get messages from them, panic when you're attacked and finally lose your cargo but you'll have learned not to rely on a pink hairy alien to fire your weapons.

Do you fancy yourself as a pitcher armed with fastballs, sliders, changeups, and curveballs? Then climb on the mound for a game of hardball. This is quite simply the best baseball game.

It features superb graphics, particularly the pitching screen, easy gameplay with pitches, fielders and batting options selected by a push of the joystick and a computer opponent that will give you a run for your money if you haven't got a human.

Finally, Law of the West is actually disappointing. It's incredibly pretty to look at with you (the Law of the West) standing with your back to the screen looking out on to a variety of western scenes.



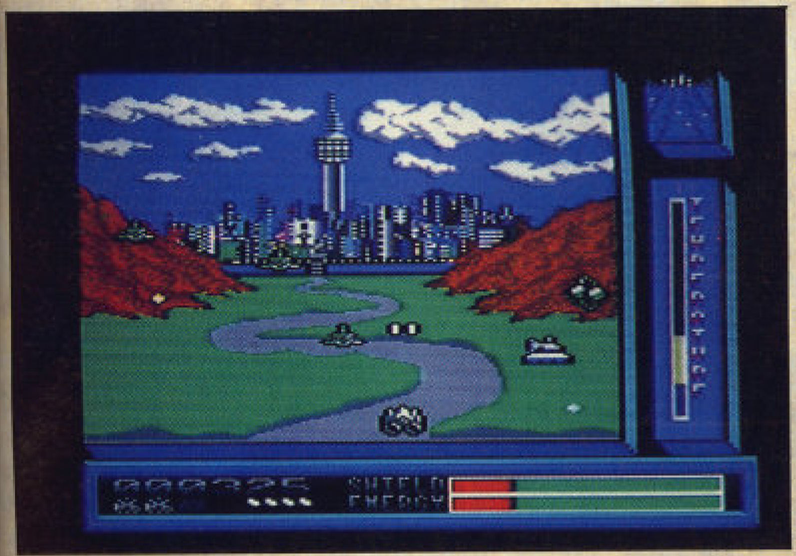
You'll be met by a selection of townfolk that will insult you, challenge you and warn you of bank raids with four multiple choice selections providing some answers. You can also draw your gun to frighten people or gun them down but you lose points for killing innocent townsfolk.

After a couple of games the situations become repetitive and the game is destined to gather dust. Despite that, the compilations still represents excellent value for money particularly for science fiction and baseball fans. **T.H.**

Touchline
Title: *Accolade Collection.* ***Supplier:*** *US Gold (Accolade), Units 2/3, Holford way, Holford, Birmingham B6 7AX.* ***Tel:*** *021 356 3388.* ***Machine:*** *C64.* ***Price:*** *£9.95.*
Originality: *7/10.* ***Playability:*** *8/10.* ***Graphics:*** *9/10.* ***Value:*** *8/10.*

U.F.O.

Battle your way through wave after wave of aliens as you defend the Earth against yet another UFO attack. This time you're commanding the only four craft – experimental F21 Condor fighters – capable of taking on the invading masses.



Unfortunately, the design is far from complete as your lasers jam if you overheat them, and you only have a limited supply of shields and energy.

The battle is fought against a series of impressive backgrounds that play no part in the game as the action takes place in the 2D foreground. This is a shame, since aliens screaming over the tops of buildings would have added a touch of reality to a tried and tedious format.

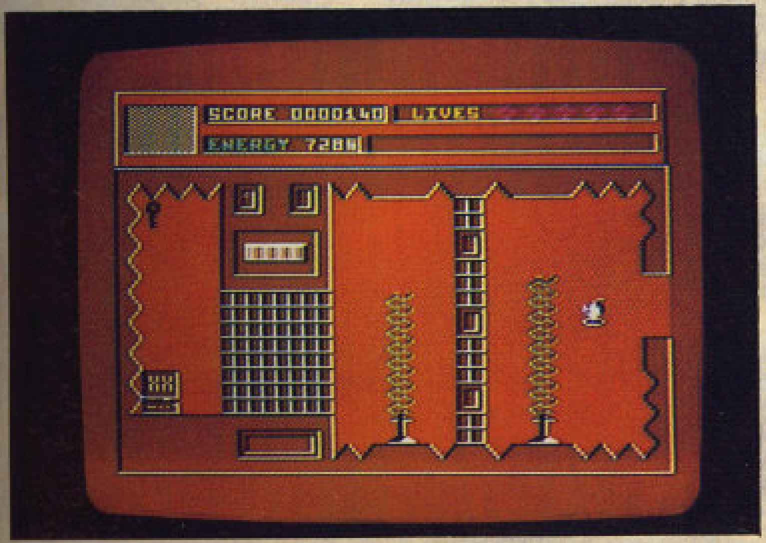
There are a staggering four types of alien that swirl around you firing energy draining bolts at you. You can fire back and can also get top up energy supplies dropped by parachute from a plane that flies untouched through the entire alien fleet. Why can't you fly that plane?

Look at the screenshot and notice the pretty background, then go and spend your money on something a little more original, realistic and entertaining. T.H

Touchline
Title: *U.F.O.* ***Supplier:*** *Firebird, Wellington House, Upper St Martins Lane, London WC2H 9DL.* ***Tel:*** *01 379 6755.* ***Machine:*** *C64.* ***Price:*** *£1.99.*
Originality: *2/10.* ***Playability:*** *4/10.* ***Graphics:*** *6/10.* ***Value:*** *4/10.*

VIDEO MEANIES

The term video nasties takes on a new meaning when you have to battle through screens of meanies in an attempt to



turn on 15 video screens ready for a day's work. The videos belong to a crazy millionaire who lives in a castle full of meanies and you're his robot.

This isn't going to be easy as you have to navigate past exploding TV's that release a shower of deadly debris, power beams that could rip you apart, blast your way through self repairing walls, find colour coded keys for locks until finally, you reach the first video screen.

You either just collect the screen and carry on with the game with a top up of energy or you can gamble on a deadly fruit machine. Press the button at the right time and you may get a bonus score, points for any remaining energy or even an extra life. Get it wrong and you'll lose a life.

Screens and screens of budget arcade action. T.H.

Touchline
Title: *Video Meanies.* ***Supplier:*** *Mastertronic, 8-10 Paul Street, London EC2A 4JH.* ***Machine:*** *C64.* ***Price:*** *£1.99.*
Originality: *6/10.* ***Playability:*** *7/10.* ***Graphics:*** *5/10.* ***Value:*** *7/10.*

DOGFIGHT 2187

In the year 2187 man faces his biggest threat as hordes of marauding aliens swarm through a split in the space time continuum. Only you, Rhett Dexter can stop them.

You manage to steal one of the disbelieving World Corporation's new interstellar fighters and head for the stars. Your mission is to find nine parts of a generator that the ancient ones spread about the galaxy to seal such a split. That's the plan anyway as the ancients and the generator are just part of the planets folklore so you hope there's some truth in them.



Luckily, the stories were true and there are in fact 100 pieces of generators scattered around the stars so finding just nine should be easy. It would be easy if you weren't constantly attacked by the alien invaders that are determined you will fail.

The game features a vertical split screen display in which one or two players can join forces against the computer or each other as they blast away at the swirling vector graphic ships.

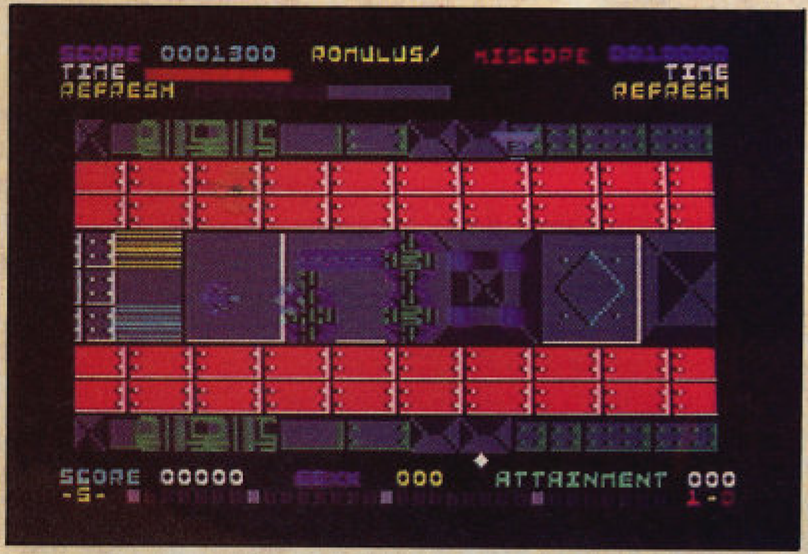
You have only 30 minutes to complete the game, accompanied by Tony Crowther music. It will push galactic dogfighters to their limits. T.H.

Touchline
Title: *Dogfight 2187.* ***Supplier:*** *Starlight Software, 68 Long Acre, Covent Garden, London WC2E 9JH.* ***Tel:*** *01 836 3411.* ***Machine:*** *C64.*
Originality: *5/10.* ***Playability:*** *6/10.* ***Graphics:*** *7/10.* ***Value:*** *6/10.*

ROMULUS

Battling through a bizarre shoot 'em up while competing in sub games is supposed to represent debugging a super computer chip in an arcade game destined for obscurity.

Since Stavros and Robinson are on holiday, it's up to you Nick Bradley, to debug the chip. This unbelievable task involves surviving an eye distorting shoot 'em-up stage in which you're bombarded by missiles and alien craft (bugs?). Survive until the time bar runs out and you qualify for the first subgame (wow!). The first thrilling subgame sets to matching colours in three pairs of rotating bars but you must also match their speeds!



If you've survived (the excitement) this far, you can take on subgame two and move the laser base left and right while firing at a bar.

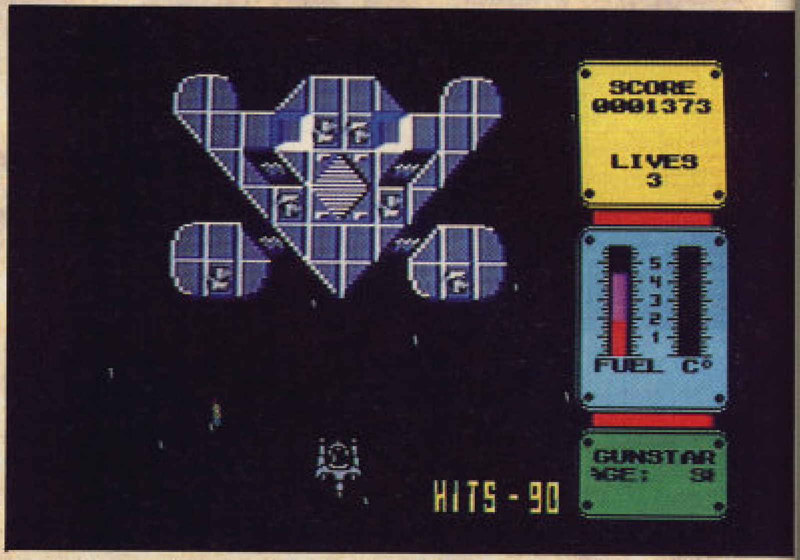
If you like your arcade games to be fast, furious and challenging then forget this one. T.H.

Touchline
Title: *Romulus.* ***Supplier:*** *Quicksilva, Victory House, Leicester Place, London WC2H 7NB.* ***Tel:*** *01 439 0666.* ***Machine:*** *C64.*
Originality: *2/10.* ***Playability:*** *3/10.* ***Graphics:*** *3/10.* ***Value:*** *3/10.*

GUNSTAR

If you like your games to be cheap and cheerful then sign up for the Gunstar fleet and defend the Earth from yet another alien attack. The aliens made easy work of the Star Wars defence system and now you must stop them.

There are five stages to this budget battle in which our heroes fight it out with the invaders from space. The conflict begins with an old fashioned shoot the swirling aliens before they get you game which is followed by a stage in which you must pick your way through an asteroid belt. Next it's a



gunfight with an alien command ship. It takes 90 shots to take out its gun turrets only to meet an Alloy robot wielding more gun turrets. Finally, you must dock with your mothership to refuel and rearm for the next alien attack.

A display strip on the side of the screen keeps track of your score, fuel and laser temperature (overheat and they jam) as well as a hint screen that gives you invaluable tips such as avoid enemy missiles and don't crash into the asteroids.

A fun game but don't expect too much from it. T.H.

Touchline
Title: *Gunstar.* ***Supplier:*** *Firebird, Wellington House, Upper St Martins Lane, London WC2H 9DL.* ***Tel:*** *01 379 6755.* ***Machine:*** *C64.* ***Price:*** *£1.99.*
Originality: *4/10.* ***Playability:*** *6/10.* ***Graphics:*** *5/10.* ***Value:*** *5/10.*

NOW GAMES 4

Five games for the price of one is the offer from the fourth in the Now Games series that features the adventures of Dan Dare, the game based on the film Back to the Future, the twilight world of Hacker, the strategic struggle of Mission Omega and a Squash simulation complete with speech.

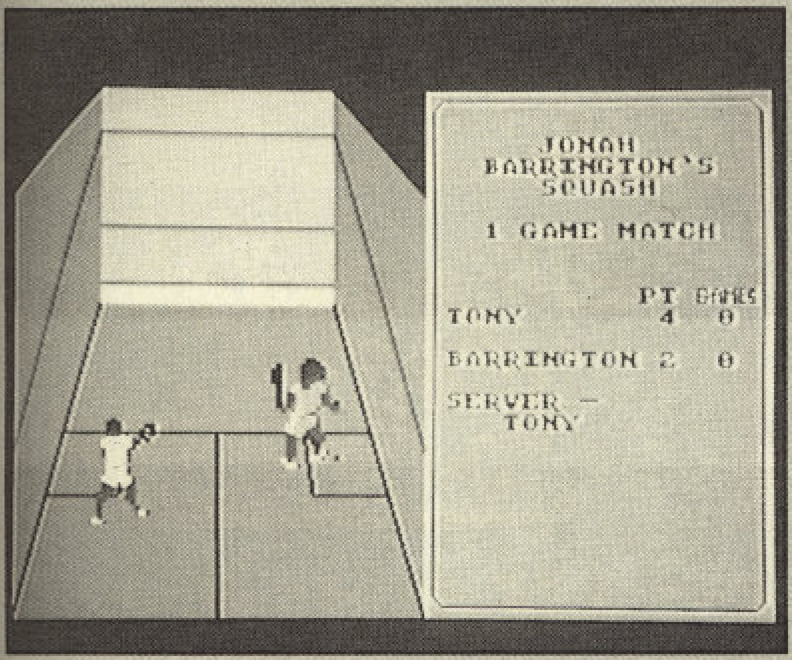
The C64 version of Dan Dare was widely acclaimed as being the best graphically and featured some superb screens. Now you can guide Dan on his quest to defeat the Mekon's



attempt to destroy the world with an asteroid. Dan must board this hollowed out craft, battle with the guarding Treens and guide a laser blast through a series of reflecting mirrors to destroy the computers.

Unfortunately, the game is let down by a cut price combat routine whenever Dan meets a Treen as the battle is resolved by high and low punches.

Back to the Future is a truely amazing game. How anyone can get the rights to a box office smash like Back to the Future and produce such an appalling game is beyond comprehension. Naturally, it features the film's main characters and your attempts (Marty McFly) to ensure you will exist. You've been transported back to the fifties where you must make sure your father meets your mother who's madly in love with you and being chased by the school bully Biffo. According to Electric Dreams, this makes the game an arcade adventure in which you must explore only five locations, five object and talk to only four characters!



Hacker brings to your screen the joys and frustrations of hacking without the summons. This game's more like the real thing than its 'guide the robots sequel' Hacker II. The game begins as you dial the wrong number and instead of your usual bulletin board you get the message to log on. Log on to what? You don't know the password or even the system you've found but you're determined to find out in an adventure where you find yourself delving deeper and deeper into the unknown.

Your task in Mission Omega is to build a team of robots to explore and plunder an alien spacecraft that's on a collision course with Earth. Earth has programmed missiles to destroy the craft leaving you only a few hours to explore the ship.

Using icons you must build your robots from a selection of bases, drive units, and balance the speed and attack and defence capabilities to its specific job. They can then be controlled manually or programmed to follow defined routes. Inside the alien ship you'll find critters to challenge your battle robots and puzzles to baffle your scouts in a game that's a mixture of strategy, arcade and exploration.

Finally, Jonah Barrington's Squash is the pick of the bunch and is a fast accurate simulation of the frantic sport. You can play either another joystick waggling human or four different computer opponents in 3D graphics with Jonah keeping the score thanks to some impressive speech synthesis. The game didn't do too well the first time round in 1985 despite its 3D graphics, speech and fast action gameplay maybe it will be second time lucky as the heavyweight part of this compilation.

In this five game compilation there is one excellent game (squash), Hacker and Dan Dare that are good, Mission Omega which will pass away a few spare moment and the dreadful Back to the Future. Now 4 also lacks the big game of previous compilations such as Lords of Midnight (Now 1) and Tir Na Nog (Now 2) and as a result is a weak compilation and just isn't worth the money. Go out and buy five budget games instead. T.H.

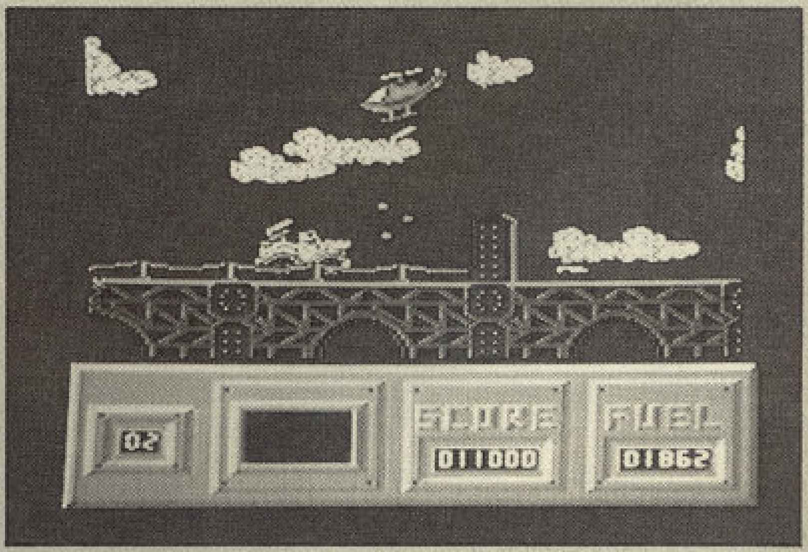
Touchline
Title: *Now Games 4.* ***Supplier:*** *Virgin, 2-4 Vernon Yard, Portobello Rd, London W11 2DX.* ***Tel:*** *01 727 8070.* ***Machine:*** *C64.*
Originality: *3/10.* ***Playability:*** *5/10.* ***Graphics:*** *6/10.* ***Value:*** *5/10.*

ARMY MOVES

Can you believe it? Ocean has released yet another Commando type game, however this is miles better than some versions of the game.

The plot for this game is far from original but, good plots these days are few and far between. You are a member of the SOC (Special Operations Core), a bunch of highly trained tough guys who are ready for almost anything!

Locked in the enemies safe are some vital plans which, in your hands could cause a big turning point in the conflict between you and the bad guys.



Reaching the stage is no easy task, there are blown-up bridges to navigate while avoiding the enemy jeeps and buzzing helicopters that drop bombs.

Stage two puts you in the control of a deadly helicopter and this time you must destroy the ground bases and enemy, but it's so damned hard.

The next stage has you flying over the sea where you are constantly attacked by submarines. The fourth stage is set in the jungle, here look-out posts will bombard any intruders (you) but these can be destroyed with a well aimed bomb.

On completing the fourth stage you are given a code for levels six and seven which can be loaded separately to save playing levels one to four all over again.

Level 6 has you trapped in a huge swamp, and progress is made by jumping on small islands. You are in the jungle

armed with a machine gun and grenades, huge birds swoop sown at you, these cannot be killed. The only way to deal with these is to frighten them off with gunfire. There are also snipers which hide in the bushes and lob grenades at you, all this must be avoided while jumping from island to island. Finally you reach the barracks, this is very hard indeed and it will be a long time before I manage to reach the plans.

Overall Army Moves has a strong addictive pull to it, with nice music and sound effects and some lovely graphics, my only moan with it, is the toughness of the game, younger players should check it out first.

Touchline:

Title: *Army moves.* ***Supplier:*** *Imagine.* ***Telephoen:*** *061 832 6633.* ***Machine:*** *64/128.* ***Price:*** *£8.99.*

Originality: *4/10.* ***Graphics:*** *7/10.* ***Playability:*** *7/10.* ***Value:*** *8/10.*

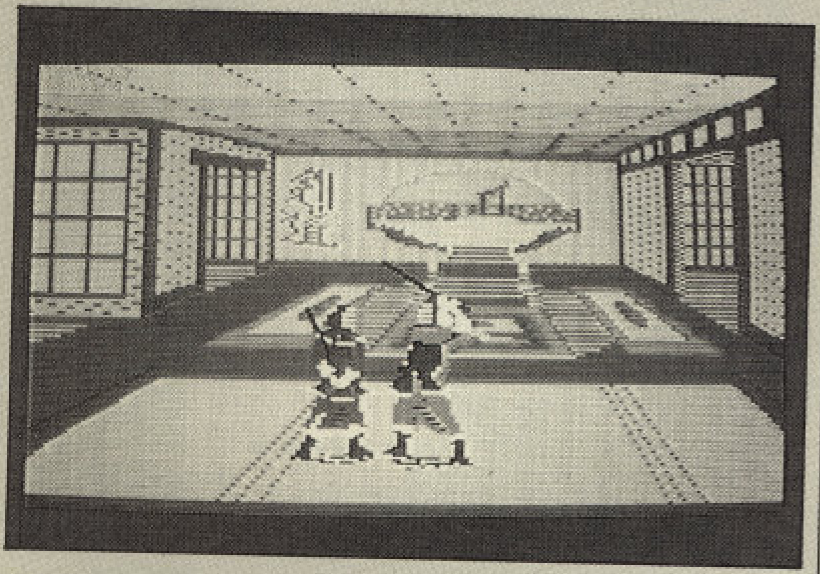
SAMURI TRILOGY

Why has Gremlin released yet another oriental beat em-up? This is the third so far and this is starting to wear a bit thin now.

OK so it is different from the rest but why can't software houses come up with an original title once in a while? Anyway enough of the moans and on with the review.

Deep in the Orient in the province of the Nang River, exists a band of fighting warriors. Highly skilled and deadly, they are the roughest, toughest warriors since Bruce Lee.

On the River Nang is a temple known as the'Ghopemup Temple' and this is where students are trained in Karate,



Kendo and Samurai sword fighting. The training is so hard that only the best student will be accepted and if he manages to graduate he will have his name inscribed on the 'Chopemup Temple' wall.

You can choose a number of options including the style you wish to fight in e.g. Karate, Kendo etc and whether to fight until death or just have a practice run.

In a practice fight you simply try out the various moves available to you, but no points can be scored. In a real fight you can choose your-defence and attack. You can also choose your opponents defence and attack points. The real fights last a minute at the end of which you have a chance to meditate to get back your strength. The methods for choosing your opponent are the same in all the types of fighting.

After playing Samurai Trilogy for a while I was hooked, the music is far out and really suits the game, the graphics are very impressice and the gameplay is awe-inspiring, this game really manages to capture the atmosphere which a lot of Karate games do not achieve.

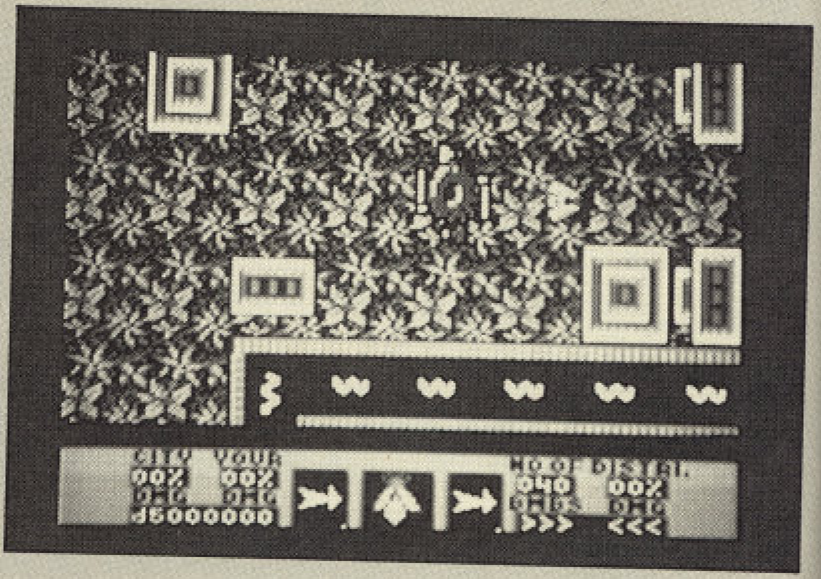
Another impressive thing about this game is the flashy presentation and the original oriental words such as Kata (combination of step punches). This goes to show that some software houses can take their time to research subjects on which their games are based, not just rush the games out as quick as they can or hype it to its teeth like a few houses I could mention.

Well done Gremlin, more like this please!

Touchline

Title: *Samurai Trilogy.* ***Supplier:*** *Gremlin.* ***Telephone:*** *0742 753423.* ***Machie:*** *CBM 64/128.* ***Price:*** *£9.99.*

Originality: *4/10.* ***Graphics:*** *8/10.* ***Playability:*** *9/10.* ***Value:*** *8/10.*



I hate insects! Not the ordinary spiders, bees and blue bottles but the giant insects that have taken over the city! Driving an Arachnus 4 armoured car that's armed with partially tested bouncing bombs you must clear the insects from the city's 25 regions.

The insects not only outnumber you but are also organised into colonies led by the queen that can produce scouts and drones as quickly as you can kill them. The scouts and drones are sent out to gather food and look for and defend against intruders. The more food they gather the faster the queen can replenish their losses.

To add to your troubles you're not supposed to damage the city and so you have to be careful when you aim your bouncing bombs since these carry on bouncing until they hit something. They also bounce a lot slower than the insects move so you have to anticipate where they're going to fly.

Although the insects don't fire back they can damage your car with contact so it's best to keep your distance until you can get your shot in. The Queen is harder to kill and is only destroyed by a superbomb that you can get from your base by radioing your superior. You can also order more bouncing bombs and get your car repaired but you have to

pay for all of this out of your limited budget.

The result is a game that will challenge you but will soon become repetitive as you face region after region of drones, scouts and queens. The game needs more insects, more action and faster gameplay.

Touchline
*Title: Ameurote. **Supplier:** Mastertronic, 8-10 Paul Street, London EC2A 4JH. **Tel:** 01 377 6880. **Machine:** C64. **Price:** £2.99.*
***Originality:** 5/10. **Graphics:** 6/10. **Playability:** 4/10. **Value:** 5/10.* T.H.

AUF WIEDERSEHEN MONTY

He's out. Good old Monty has escaped to fight again. However, he still isn't safe and this is where you step in.

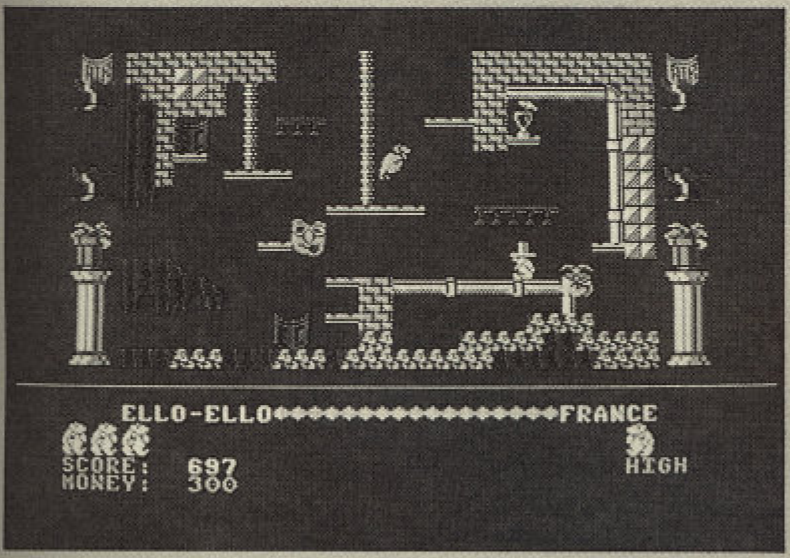
This game, like the previous Monty games, is simple to play, thoroughly entertaining, and difficult to get anywhere.

Your job is to guide Monty around Europe trying to collect enough money for him to buy his own island.

Monty starts off his journey in Gibraltar but he's got to leave and quickly, as Interpol are onto him. Someone's sneaked on him.

To make his escape Monty needs to collect money and airline tickets which just happen to be laying around, though not usually easy to get at.

In order to get enough money Monty must travel around Europe collecting and selling certain items on his way. As in



any other game there are many things to avoid. For instance if you run into a bottle of wine you will find Monty in a drunken stupor for a certain length of time, which can of course be hazardous to your health if something is bearing down on you.

You need to be a jack of all trades to help Monty succeed. You may be required to flog the Mona Lisa or even enter yourself into a grand prix.

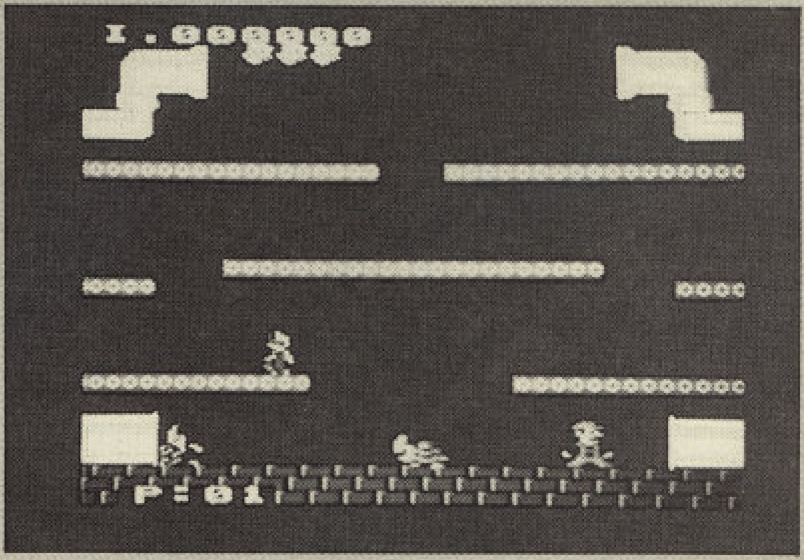
The one difference I found with this game from other platform games is that once you've had enough of one country, as long as you have an air ticket and some money, you can take of in a plane and take yourself elsewhere. Extra points may be gained in flight by flying into the planes in front of you.

As you visit each country its national anthem is played. As long as you're into music you can't forget where you are.

If you are a platform game fan you should enjoy this one. It does have a few differences to the norm and an overall aim behind the game.

So swat up on your geography and go give Monty a hand.

Touchline S.G.
*Title: Auf Wiedersehen Monty. **Supplier:** Gremlin Graphics, Alpha House, 10 Carver Street, Sheffield S1 4FS. **Tel:** 0742 753423.**Machine:** C64.*
***Originality:** 3/10. **Graphics:** 6/10. **Playability:** 9/10. **Value:** 9/10.*



MARIO BROS

Mario and Luigi are the famous Mario Brothers who clear pests from pipes to make the money for the spaggetti (to be read in an italian accent).

Mario on his own, or with Luigi in a two player game must clear the turtles, crabs and flys from the pipes by flipping them over as they crawl along the game's platforms in this conversion of a three year old Nintendo coin-op game. To kill the critters you must get under them and jump up to bend the platform they're crawling along. This will flip them over leaving them vulnerable to a swift kick to finish them off. You have to be quick to deliver this final blow as they'll struggle to right themselves and continue their relentless march. You also have to be careful not to flip them again or they'll be back on the move again.

If you clear the screen then it's on to the next level packed with more turtles, crabs and flys as well as balls of fire that track your every move. All is not lost as you can also collect bonus disks and even hit a POW plunger that flips all the nasties on the screen (even those already flipped).

The action is mildly addictive particularly when Mario and Luigi work together (although you wouldn't think it if you heard the arguments about who's fault it was). Unfortunately, looks and plays like an old game that just isn't worth a full price tag. Instead why not look at any of the coin-op conversions featured elsewhere in this issue such as Nemesis or Archanoid. T.H.

Touchline
*Title: Mario Brothers. **Machine:** C64. **Supplier:** Ocean, 6 Central Street, Manchester M2 5NS. **Tel:** 061 832 6633*
***Originality:** 4/10. **Playability:** 6/10. **Graphics:** 6/10. **Value:** 5/10.*

FUNGUS

Have you ever been decapitated by a fir tree or a bird? Well if you don't fancy the idea don't offer to guide Fungus while he goes hunting mushrooms inter-galactically. He'll get you into all sorts of trouble.

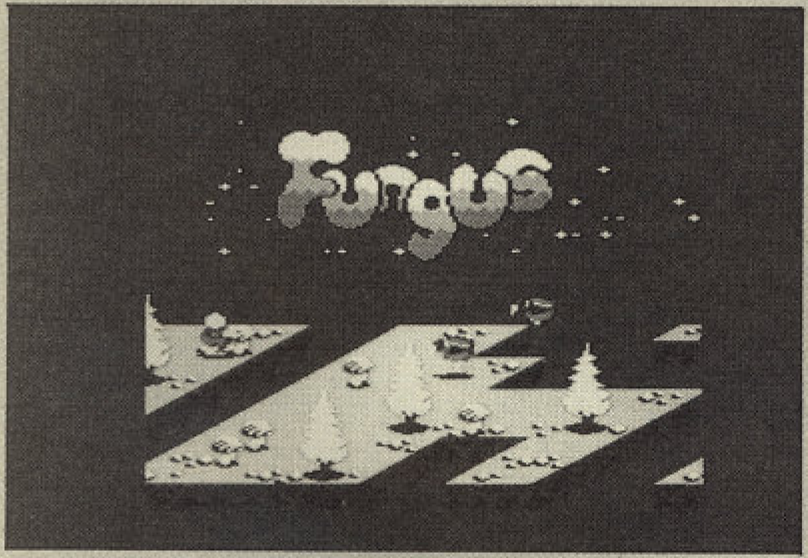
Fungus is part of a two game pack from Players. If you do take the challenge then you'll need to have your wits about you as it is very fast moving. No sooner do you think that you have made a safe landing and start eyeing up the next batch of juicy mushrooms when you walk into another tree, or even better over the top of a cliff.

The writer has introduced a new concept for growing mushrooms, on islands floating about the galaxy, funny, I always thought that they were stars. For some reasons the mushrooms seem to grow very well in this strange atmosphere surrounded by poisonous trees, lethal shrubs and weird creatures.

The idea behind the game is to keep Fungus's craving for Great White Mushrooms satisfied, and believe me that's not easy.

As you leap along from one island to another there are different hazards awaiting you. What makes the game even more difficult is that the islands are in three dimensions and sit at an angle on the screen. This sometimes leads to the impression that you are on the right path to avoid a tree when you end up walking slap, bang into it.

However, even though Fungus is difficult there is no reason why you shouldn't enjoy it,it does have a certain "one more go quality".



The second game in this two game pack is called Fruity. This game calls for a bad case of 'watch the birdie'. No I don't mean grin like a cheshire cat I mean watch the vulture that is hovering above you.

Unfortunately this second game doesn't compare at all well with the previous one. The aim is to collect fruit from trees in an orchard and of course, like every other fruit picker I've seen, you do this by leaping up and down ona trampoline.

To make life a little harder you don't jump straight so you have to move the trampoline around so that you always land on it, otherwise, yes you've guessed it, you die.

I found Fruity extremely monotonous. The only variety being the kind of fruit that you pick and the increase of speed with each level.

Being a budget pack I would say that this collection was a good one for the kids although they may find it a little difficult. For expert game players I don't think that there's much here to keep you occupied for long.

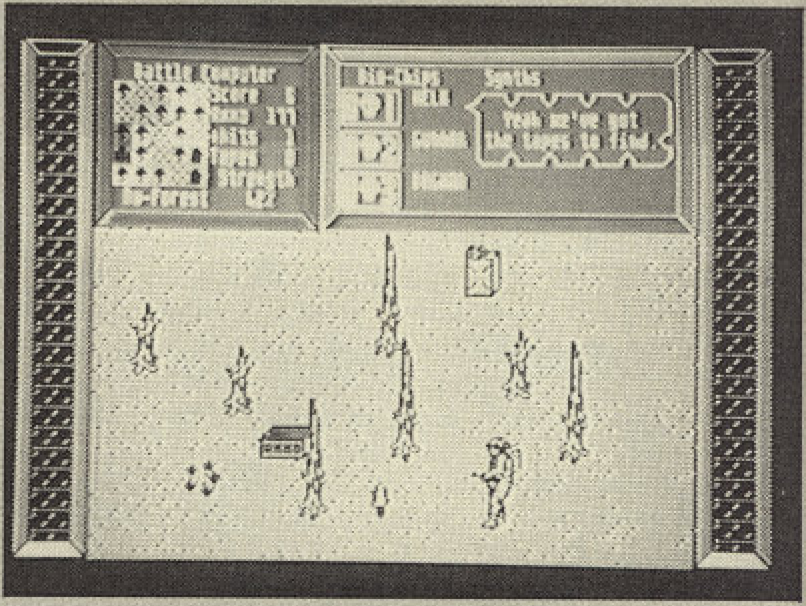
If you like simple but fast games then this may be for you.

S.G.

Touchline

Title: *Zap Pack – Fungus and Fruity.* ***Supplier:*** *Players Software, Calleva Park, Aldermaston, Berks RG7 4QW.* ***Tel:*** *07356 71505.* ***Machine:*** *C64.* ***Price:*** *£4.99.*

Originality: *8/10.* ***Graphics:*** *6/10.* ***Playability:*** *4/10.* ***Value:*** *6/10.*



ROGUE TROOPER

You are Rogue Trooper. A genetic infantryman specially engineered to breathe the poison chem-clouds of the Nu Earth. You are also the only survivor of the Quartz massacre and out for revenge.

Your only companions in your struggle to find eight vid tapes that will catch the traitor, are the personalities of your three GI buddies stored in your gun, backpack and helmet. These yell out useful advice about what to kill (everything),what to collect (ammo, medikits and vid tapes) and the odd tip such as reminding you to search behind walls.

The action takes place on the polluted 3D world of Nu Earth that's constantly patrolled by the enemy Norts that will shoot you on sight and even Southrs (your side) who think you're a deserter.

Unfortunately, the action is also desparately slow and features Spectrum like colours and graphics with one of the worst scrolling routines you are ever likely to endure. The game was originally written for the Spectrum which explains the conversion but I feel that C64 owners expect more since their machine has twice as many colours, sprites and three unused sound channels.

A good base for a game that could have been a lot better.

T.H.

Touchline

Title: *Rogue Trooper.* ***Supplier:*** *Pirahna, 4 Little Essex St, London WC2R 3LF.* ***Tel:*** *01 836 6633.* ***Machine:*** *C64*

Originality: *4/10.* ***Graphics:*** *3/10* ***Playability:*** *5/10-* ***Value:*** *5/10.*

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LAND OF LEGENDS

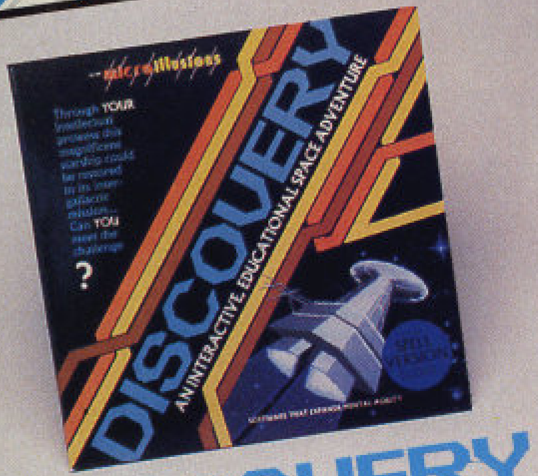


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All of these products are now being developed for the Amiga, and will soon be available in other formats (C-64/128, IBM/PC, Apple, Atari ST).

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AMIGA NEWS

Video Triangle

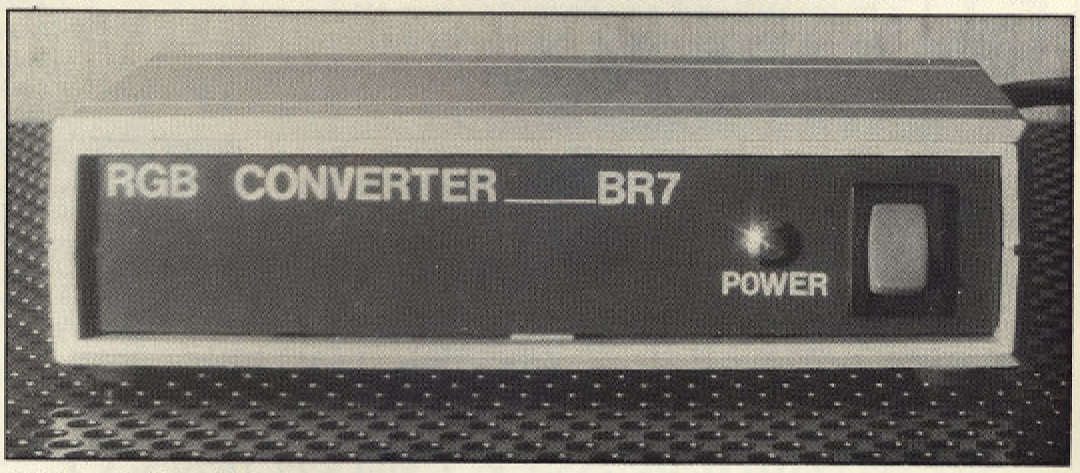
Triangle Television has opened a new sales department which specialises exclusively in Amiga systems.

Triangle's sales Director, Peter Barrett said: "Our new department offers a full range of facilities, including Amiga sales, and a full range of software with a 24 hour Mail Order Facility. We also offer a comprehensive Amiga training programme for audio visual and business users, and we have an exciting research and development section which is working on a new range of devides to exploit the full potential of the Amiga in the AV and video encironment."

Triangle Television is located in South West London, and if you would like to see some of the systems in operation then you may call the number in touchline to make an appointment.

Touchline

Triangle Television: *130 Brookwood Road, London SW18 5DD.* ***Tel:*** *01 874 3418.*



TV Converter from Triangle.

Flipside!

Mycro-Systems Software, makers of *Scribble!*, *Analyze!* and *On Line!*, has announced the release of *Flipside!* for the Amiga.

Flipside! performs wide side printing on just about any program that uses text or IFF files. Compatible with most printers, *Flipside!* has many unique capabilities. For instance, if you were to create a large spreadsheet with *Analyze!*, *Flipside!* will allow you to have unlimited columns widths and cells by printing the sheet on its side, as wide as necessary.

Flipside! requires 512K and its suggested US price is $59.95. It can inter face with all Micro-Systems' other Amiga products.

Touchline

Micro-Systems: *4301-18 Oak Circle, Boca Raton, Florida 33431.* ***Tel:*** *305 391 5077.*

Earn An Amiga

Audiogenic Software is currently running a recruitment drive to find programmers who can write a top 10 game.

As an added incentive to make people come forward, apart from the obvious one of royalty payments, Audiogenic is offering writers of new games, whose product reaches the Gallup top 10 a Commodore Amiga 500 worth over £500.

For anyone who writes a game for Audiogenic which reaches the number one spot in the Gallup software chart, there is an Amiga 2000 plus hi-res colour monitor waiting to be claimed. this is worth over £1500.

Audiogenic's Peter Claver said :"Audiogenic has always had a good reputation for games but we're no longer in the top 10 companies. We aim to get back there, and we want out programmers to share in our success."

Touchline

Audiogenic: *12 Chiltern Enterprise Centre, Station Road, Theale, Berks RG7 4AA.* ***Tel:*** *0734 303663.*

Games From Psygnosis

Liverpool based Psygnosis has been writing software for the Amiga games market for about two years. The company has recently announced two new launches.

The first is *Barbarian*, an animated fantasy graphic adventure in which the player becomes Hegor the famous dragon slaying barbarian.

His task is to enter the underground world of Durgan which is terrorized by the evil Necron. In the underground real there are gruesome monsters to contend with as well as hidden traps, in the quest to destroy the lair of Necron and claim the crown of the Kingdom.

The second game for the Amiga is entitled *Terrorpods*. It is a strategy arcade game in which the player must attempt to defeat the invading Tripod forces. The action is set against a 3D playfield with perspective scrolling. All defensive and offensive action takes place in a high speed environment where even trading must be accomplished against the clock.

Agility of both mind and hand is needed in this game which covers trading, resource management and defence of yourself and your installations in order to achieve your ultimate aim of destroying the Tripods and their mothership.

Both feature artwork by science fiction illustrator Roger Dean and cost £24.95.

Touchline

Psygnosis: *First Floor, Port of Liverpool Building, Pier Head, Liverpool L3 1BY.* ***Tel:*** *051 236 8818.*

Amiga Agony

When you have finally saved up enough money and bought your Amiga, you're bound to find many aspects of your new machine confusing. Here's where you can come for help.

By George Duval

To Buy or Not to Buy

Having read a great deal of articles on the Amiga, I decided to purchase one. Unlike many readers, I use my computer purely for pleasure, and saw the Amiga as a natural progression from my Commodore 64, which I like to think I have mastered.

Anyway, just as I was about to place my order, I read in your magazine about the new Amigas,and particularly about the new A500. Consequently, I have a few questions to ask. Firstly, can the A500 be expanded as much as the A1000? Secondly, will *all* A1000 software run on the A500? And finally, if the A500 is so similar in specification to the A1000, why is it so much cheaper?

Simon Weldon, County Down

Yes, yes and who knows? Firstly, the A500 is, with all due respect to the powers that be at Commodore, an updated A1000 in a different box. It is just as expandable, has all the same ports, and will run all the same software. The only idfferences there are relate to the power supply and the motherboard construction.

How Commodore can continue marketing the A1000 I am not sure, but in your case I would buy an A500 without any qualms.

Play it Again, Sam

I am a freelance musician interested in using computers to further the state of music in this country. At the college where I lecture, there are two Commodore Amigas used by the science department for a variety of tests. For the summer holidays I have been able to organise the loan of one of these machines and I was wondering if you knew of either a MIDI interface or some Sound Sampling software that is currently available, and hopefully not too expensive.

K. McMillan, Gwent

The only software of this type that I know to be available now is from Precision Software. Produced by Mimetics, an American company, both products come with both hardware and software.

Although I haven't used either package, I have heard a disk of the samples that can be created and they are, to say the least, spectacular. Precision Software can be contacted on: **01 330 7166**.

Slow Train to Go

Having used an Amiga only a matter of weeks after graduating from an IBM PC AT, I have one major problem. How on earth can the disk drives be so slow? When I am using *Logistix* it is not too bad, but *Textcraft* is paralysingly slow. Is there anything I can do about this, or will I have to learn to live with it?

John Barns, Chiswick

AmigaDOS has come in for quite a lot of criticsm over the last few years, and none of them more justified than this. Unfortunately, there is very little you can do about it, short of buying a hard drive or swapping back to your AT.

One answer you might look at is the new A2000, with an IBM PC compatible board. Using some clever hardware tricks, it has been made possible for users to partition the hard drive, with sections for the PC, and sections for the Amiga. This could provide the ideal answer, although, paradoxically, it is by no means a cheap one.

Taking You to Task

Although the Amiga seems to be a very good computer for specific tasks (excellent graphics, good stereo sound) the aspect of the computer that should really be causing a stir is surely its multi-tasking abilities. What practical advantages does multi-tasking really bring?

Peter Tookey, Southend

Multi-tasking is, in my view, the single most important feature in the Amiga. Users who play games or produce graphics probably won't even notice the multi-tasking, it is only business users who can really reap the true benefits.

Although there is a dearth of business software for the A1000, the new A2000 ought to change that, and when it does, a new generation of software ought to become available, all using multi-tasking. In simple terms, multi-tasking means that the computer can split its processing time between various so-called tasks. A good example would be that you could print out a document from one word processor whilst writing an article on a seperate word-processor. Admittedly this slows the computer down, but the speed reduction still leaves the Amiga running faster than an IBM PC!

Very few packages yet allow the user to make the most of multi-tasking, one exception to this is Scribble which, for all its faults, allows the computer to work at other things, communications for example, while processing a file.

Horsing Around

As a gamesplayer whose father recently purchased an Amiga, I have found the drought of decent software is slowly but surely ending. However, I still find it surprising that some of the games are of such poor quality. Why is this? Why don't the programmers take advantage of the 'Blitter'?
David Tweed, London

This is a very good question, but I'm afraid to say that the answer comes down to money. As yet, there are not enough Amigas about, particularly in the UK, for many software houses to justify writing games for the machine. As well as this, most games that are released tend to be conversions, almost all of which are identical to the Atari ST version. In many ways this defeats the object of buying an Amiga, and I can understand your annoyance.

On the other hand, there are some excellent games starting to appear. Rainbird has added a great deal to Starglider before releasing it on the Amiga, and Psgnosis is about to release a host of quality 68000 products. Bear with the machine, it will be worth it in the end.

Printing by Numbers

It is all very well me having my Amiga, and being able to produce incredible pictures using *Delux Paint II*, but how can I get colour hard copy? I have tried taking photographs but I continually get thick black lines across the screen, and I only have a Epson FX-80 printer. Any advice would be gratefully received.
Niall Stevens, Catford

Without wanting to turn this into a photographic magazine, this is a frequently asked question, and there have been quite a few differing answers. Personally, I feel the slower you can take the shot the better. Use a tripod, and open the aperture as far as possible. Then set the speed to around one second and shoot away. Generally these results are good, although the screen does tend to 'bend' at the corners. YA

Fast Flowing

One of the main uses of computers, is supposedly their ability to help you organise your life. Flow may be the software that will save writers of all kinds a lot of hassle.

By Anne Owen

Flow is a productivity tool, one of a new generation of software, often pioneered on the Apple Macintosh, which is designed to aid our creative processes. It is subtitled *Idea Processor for the Amiga Computer*. I have only ever had one good idea so this must be for me.

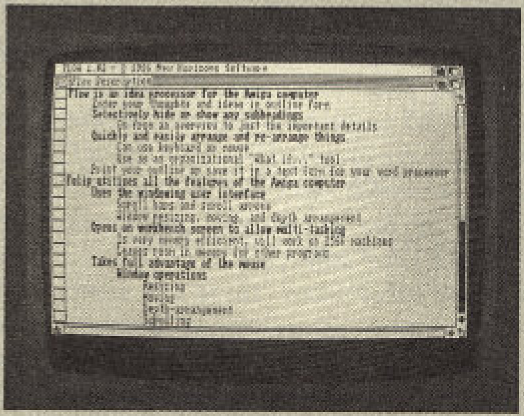
The disk is accompanied by a classy manual which is designed to go into your Amiga file. It displays all the features of a well planned document which *Flow* must surely have helped create. Every aspect of the software is dealt with in a step by step manner with reference to the example files supplied on disk. There is a reference section and index for the regular user and a strip of card with the function key operations clearly marked to lay across the top of the keyboard.

Flow can be used for mapping out your ideas for any project and I am completing this article in *Textcraft*, having transferred the framework of the piece from *Flow*. Don't judge the product by the quality of my writing, however! That might be unfair to New Horizons.

I could have used the *Flow* editor to write the complete piece but I preferred to take advantages of *Textcraft* to complete the review. So I used *Flow* to create an organised set of facts and ideas which I am now expanding upon. Nevertheless, *Flow* has some of the features of a wordprocessor with full screen editing and cut and paste facilities to help you get your written ideas into shape

Processing

What can *Flow* do for your ideas? Quite a lot if it helps you lay them out in a logical order so that you and others can make the best of them. And that is what *flow* does when you create



what is referred to as an outline. It provides highlights such as bold text and indents to create a hierarchy of ideas. The main idea becomes a heading, its offshoots become subheadings and their offspring indented text. These blocks can be 'collapsed' into their sub or main headings only or expanded again to display all text on screen. A heading can be moved up or down in the hierarchy as your emphasis changes.

Once your ideas are formulated and categorised you can search the outline for a specified heading, you can find matching headings or sort the currently selected level of headings into ascending or descending order (alphabetic and numerical). These functions and the text editing functions can apply to the entire outline or just a selected part.

The outline can be printed out as seen on screen or in its full form. Highlights and indents are transferred to the hardcopy. *Flow* projects can be saved in their own format for safe keeping on disk but they can also be saved in a 'text only' format. In this form they can be transferred to other software packages such as a wordprocessor or page planner or despatched via electronic mail.

Flow is capable of holding pretty large outlines. The specification is up to 32767 headings, 32767 indentation levels and a maximum of 200 characters per heading. So your first novel shouldn't be a problem.

The Best Ideas

Wordprocessors like *Textcraft* and *Scribble!* make the shunting of text and headings an easy matter without rekeying but, by providing a custom environment, Flow makes this haphazard on-screen design process so much more organised.

What I do find is that for short or less consequential pieces of writing, I jump straight into a wordprocessor, bypassing *Flow*. However, when something needs thinking through or the project is a large one, *Flow* is invaluable for creating a template with which to work. You can print out from *Flow*, consider your ideas at leisure and return to ammend then until you are totally happy and ready to put flesh on the skeleton.

That's the writer's point of view but also bear in mind the database like search and sort qualities (demonstrated in a supplied Amiga magazine bibliography) and the very professional presentation you can achieve for, say a schedule, agenda or management brief. At first I considered *Flow* a bit of a luxury but it's one I wouldn't now wish to be without.

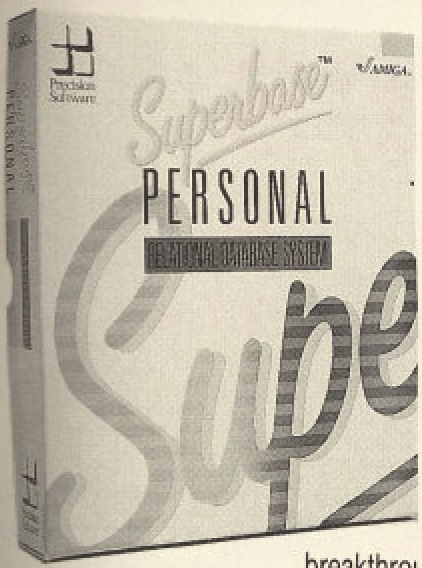
New Horizons is currently developing the *Pro-Write* wordprocessor and it will be interesting to see if an idea processing feature is incorporated or if that task is left in the capable hands of *Flow*

Touchline

Name: *Flow.* ***Price:*** *£99.95.* ***Machine:*** *Amiga.* ***Supplier:*** *New Horizons Precision Software, 6 Park Terrace, Worcester Park, Surrey KT4 7JZ.* ***Tel:*** *01 330 7166.*

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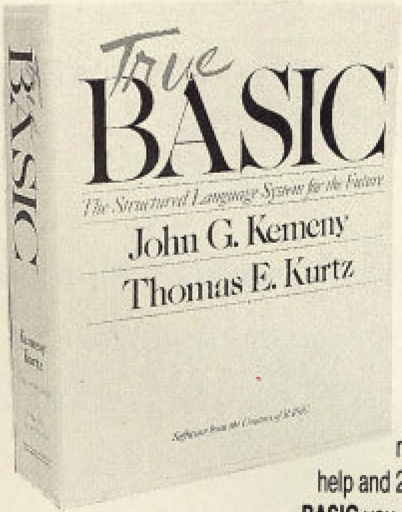
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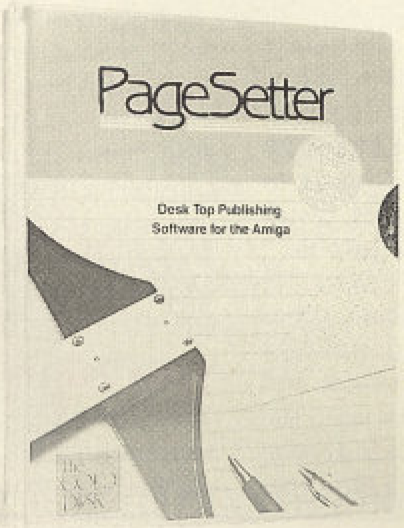
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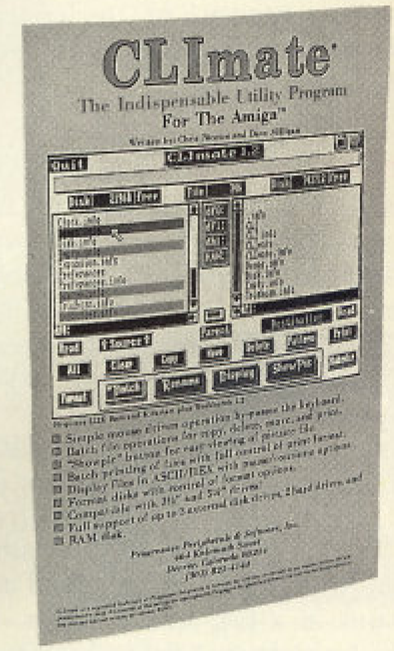
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Video Stars

One of the Amiga's many applications is in the field of graphic presentation. But how do you link your computer to your video recorder?

By Anne Owen

For combining computer and video the Amiga has no peers in the microcomputer world. Triangle Television, a company based just down the District line in London SW18, is pioneering the use of the Amiga with professional video equipment. Triangle is a production company with a background in video allowing supply of a complete package, including training in the art of making a video.

Jigsaw

Triangle is combining the A500 in the role of caption generator with a professional video setup produced by Unitron. The A500 supplied is a one megabyte version (using the *Alegra 512 RAM* card). The combination has been christened *Jigsaw*.

Included in the price is software such as *Deluxe Paint 2, Deluxe Video* and JDK Images' *Pro Video* software. *Pro Video* supplies a superb range of on screen fonts which are typed in and laid out in a full screen editor. Font and background colours are selectable. When the 'pages' have been completed, they can be strung together using a variety of special effects and delays.

The inclusion of the A500 helps make the *Jigsaw* video system very competitive. The package provides everything you need to complete a video including post production editing and mixing. The hardware includes camera, remote video tape recorder, two video tape players, MSX console and effects/caption generator (A500). Unitron's MSX (no relation to the micros) console already integrates many of the video production functions, such as preprocessing and signal stabilising, cutting down on the inconvenience of cabling and interfacing. The future may even involve the Amiga in controlling remote video equipment as well as generating images. In the meantime, the latest three dimensional graphics generated using the Amiga will add to the special effects repertoire. There is also the promise of video and computer combination for games and entertainment in the not too distant future.

Training for Quality

The training support for purchasers of *Jigsaw* consists of up to four days working with the system and a follow up session at a later date (to "coerce" companies to learn). Through training, Triangle Television aims to make sure that these systems result only in imaginative, not "snoresville", videos!

Current customers include other production companies and colleges which train students in television and video production. Triangle sees the business sector as the biggest potential customer. With *Jigsaw* and a Triangle training course, a marketing department should be able to embark with confidence on the creation of videos for publicity, exhibitions and their sale force. I recently bought a product after seeing a video demonstrating its qualities in my own home. Half the homes in Britain now have a video player so there is obviously great potential here. Current video production costs are high and the *Jigsaw* system could be paid for by just one in-house production.

For those who do not require the full production facilities, Triangle Television also supplies the A500 with various combinations of the equipment mentioned, right down to suitable software and genlock. There are also training courses on how to effectively use Amiga graphics software for video titling, starting at £95.

Video Jargon

Your Amiga quick guide to the video terminology now needed when talking about your Amiga:

Bang –	instantaneous appearance of screen
Checkerboard –	builds a display out of 'shattered glass' pieces
Fade –	colours fade to background colour
Pull –	the roller blind effect with the new screen scrolling over the top of the old
Reveal –	the old screen slides away to reveal the new one beneath
Roll –	the new screen pushes the old one aside as it scrolls into view
Slide –	the whole screen slides
Trickle –	the screen forms up as bits are randomly dropped into place, starting from the top of the screen
Wipe –	the new screen wipes away the old as it scrolls into view

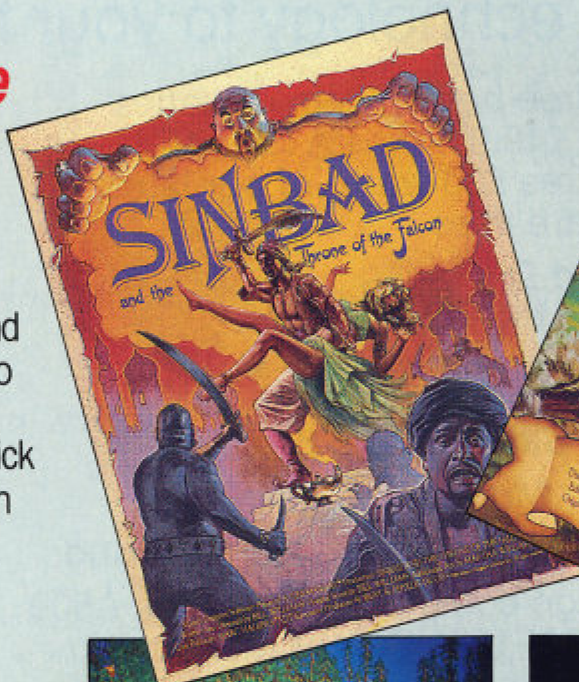
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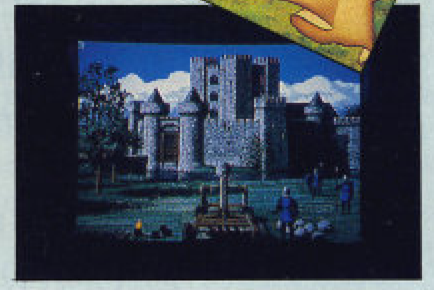
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Sounds Fantastic

Amiga owners with musical leanings are on the look out for packages to aid their electronic expressions. Futuresound from Applied Visions has a lot to offer.

By Anne Owen

A major factor in the success of the Amiga 1000 is the audio hardware, a no compromise solution of digital to analogue conversion producing stereo sound, two 'tracks' per channel, four in all. The A500 is set to revolutionise the way we play our games. It's going to be a case of "off with the Walkman on with the Amiga headset".

The A500 and hi-fi will have to live together or some nifty 'tech trolleys' purchased. Would the Amiga technology have been chosen for the new generation of coin-op machines if the sound hadn't come up to arcade quality?

As well as pleasing the public, the Amiga helps programmers because, as with graphics, sound can be stored in an IFF format, a standard format interchangeable between software packages and sometimes even computers. So a library of sounds can be put to use in a number of different ways.

Which brings us to the creation of sounds. The audio hardware can be programmed to automatically retrieve sound data through four channels, each assigned to an eight bit digital to analogue convertor. That data can be set up by the programmer (with Basic SOUND and ENVELOPE commands for instance) or it can be generated by sound sampling. This is where the *Futuresound* product from Applied Visions comes in.

Futuresound provides the fast analogue to digital (outside world to Amiga) conversion to compliment the Amiga's D to A output. *Futuresound* "digitises" sounds that it receives from one or both of two inputs. The first input is the microphone, which is supplied. The microphone is fairly sensitive, registering the normally inaudible purr of the Amiga 1000 fan. The second input comes direct from a sound producing device such as a radio tape or video recorder, compact disk, electronic keybord and so on. You just plug the sound source into the auxilliary input of the *Futuresound* unit. If both sound sources are plugged in then a 'mix' will result.

The *Futuresound* box plugs into the Amiga via the printer port, providing a through connection for the printer, which now plugs into the *Futuresound* unit. A red button on the front panel indicates that *Futuresound* is active by lighting up. Pressing the button switches over to the printer.

Software Studio

The *Futuresound* software sets the Amiga up as a sophisticated four track digital tape recorder. Only one track can be recorded at a time but, once recorded, any combination of tracks can be played back.

The all important recording level is set by turning a knob on the front panel of the unit. The recording level is displayed on screen in much the same way as you might see it registered on the front panel of a tape deck. If the ideal level is superceded then the visual display jumps out of the box to alert you. The ideal recording is at the highest possible volume without causing distortion or "clipping" – so called because the out of range frequency is clipped off and remains unrecorded. Once recording has started, the sound level display is suspended.

Each "moment" of the sound is stored as an eight bit number between - 128 and +27. One sample is taken at a time and stored sequentially in memory. The rate of sampling is under software control, defaulting to 10,000 but capable of up to 28,000 samples a second. The faster the sampling rate the higher the quality, the more memory you use up and the shorter the recording time. It is up to the sound recordist to match the quality of the sound with its potential use. A sample rate of 7,500 is roughly equivalent to the quality provided by the telephone. I found that dialogue, either original or pinched from films or radio, reproduced more effectively than music.

The tape recorder analogy continues with editing (where all operations except for 'clear all tracks' apply to the currently selected track) and playback (where any combination of tracks can be activated). There are PLAY,STOP, Fast Forward and REWIND controls. The sound track is now graphically represented in a screeen window through which you can pan sideways. This movement through the track is achieved in window sized steps, with FF and REWIND, by clicking in the window with the mouse, or a Byte at a time for precise positioning.

Editing in fine detail is catered for. A box displays the value of the sample at the cursor position. You may zoom in on the centre of the graph window and set start and end points within the track. Playback and special effects always apply themselves to the recording between the current start and end points. These can be reset from the TRACKS menu. Any part of the recorded track can be 'zeroed' or scaled up (louder) or down (softer).

Soft Sounds

The *Futuresound* software deals with the boring bits, the file handling, with reasonable efficiency. A data risk is created automatically from the menu by placing a 'soundfiles' directory on to it. As well as LOAD and SAVE, RENAME and ERASE are also available on a menu so that *AmigaDos* is avoided.

Loading and saving applies to the selected track and takes one of three possible formats. The simplest is *Futuresound's* own format, size of file, sample rate and data. The other two are IFF formats, a 'one shot' for recordings that will be played back 'as is' and a three octave option designed for short sounds which will be used as musical notes. *Futuresound* works out the other two octaves which you don't have and, if specified in the graph window, will save a sound with two parts, one of which becomes the sustain element of the sound.

The latter format opens up the possibility of recording instruments under controlled conditions (perhaps with C-ducer style microphones), saving the samples and then incorporating the sounds into a piece of music or theme tune for a very realistic end product.

Sounds Effective

The variety of inputs accomodated means that you can have fun mixing very different sounds for impact, singing birds and hammer drill for instance. There are numerous sound effects records available to experiment with as well as your own original sources.

Dialogue, especially in stereo, proved very effective but



incorporating "speech" into other software is restricted by memory requirements. I don't expect this to stop the programmers achieving it however and the example programs supplied by Applied Visions in C and Basic will speed this process.

Futuresound is a professionally presented product, from the solidly built hardware to the neat manual with large type and clear diagrams. If your hobby stretches to £149, or sound sampling is something you need to achieve on the Amiga, then I am unaware of a better way of performing it.

Each track has its own volume control, an on/off gadget and a once/loop gadget. The latter is a source of continual inspiration. For instance you can make short sharp recordings of instruments on three tracks for playing in a loop and one long 'lead' recording on the fourth:

track 1: loop "doo wop" chant
track 2: loop bass drum beat
track 3: loop snare drum beat
track 4: once lead vocal

A simple technique for capturing a particular sound is to record for a few seconds, set the start and end markers around your chosen sound, allocate some memory in another track and copy the marked sound ot it. Instead of copying to an empty (although with memory allocated to it) track, you can mix your first sound into an existing recording on the destination track.

Touchline

Name: *Futuresound.* ***Price:*** *£149.* ***Machine:*** *Amiga.* ***Supplier:*** *Applied Visions.*

Zing!

Software for the Amiga becomes more sophisticated by the day. Zing! has the potential to be a must for Amiga owners.

By Anne Owen

Meridian's *Zing!* is not an extension to the current CLI or Workbench. Rather it falls between the two, aiming to retain the user-friendliness of Workbench but unleashing the power of AmigaDOS. Meridian claims 1.25 man years work on the software, so how successful has the design proved to be?

Multi Useful

Zing! has the potential to be many things to many Amiga users. It fires on twin carburettors. Firstly there's the ability to move around directories and files on an AmigaDOS disk, carrying out DOS-like commands but without typing command sequences. Secondly, there are the utilities which 99% of Amiga users will find very useful indeed. I had personally been waiting for just such a set of utilities ever since I bought my Amiga.

Application packages for the Amiga often shut out AmigaDOS. If they are run from a CLI window then it is possible to return to that window to carry out a disk management before re-engaging in wordprocessing or pagesetting etc. *Zing!* gets around the problem in a much more direct way – the hot keys. The left Amiga key plus the function keys 1 to 10 are set up to, in order, bring up a file system window, a new CLI window, to save the screen to IFF files, to save the screen to printer, to set the screen dimmer time interval, to bring up the disk copy window, the format disk window, to set the *Zing!* defaults and to bring up the *Zing!* hot key window.

The heart of *Zing!* is the file system menu but the screen saver and disk management windows are real boons. The *Zing!* defaults are the abbreviated commands assigned to the 10 function keys used in the file system. In defaults they can be changed to suit. You can also turn on and off case sensitive and advanced pattern matching – with which the manual deals in a rather obscure fashion. The task monitor is a bit of a gimmick but it is fun to watch the status information being updated as a number of tasks perform before your eyes.

Disk Filling with Frills

The file system window looks out on your disk files and directories and is packed with information. At the press of a mouse button you can get the current time and date (important when you are date-stamping files), the system memory available, the files and bytes in the directory on display and which page of the display you are on. You can click from page to page, size the window and scroll within it. At the bottom of the screen are the gadgets representing the current function key arrangement.

You can browse through the directories by double clicking on their names. Selecting 'parent directory' takes you back to the level above.

The 'change directory' window provides a set of device names (those not available are ghosted) to choose from, a requester for the directory name and a CD gadget to make the move. Double clicking on a device brings up a tree window with a list of available directories through which you can move before clicking on your choice. The pathname to the directory is automatically completed for you.

Double clicking on a filename brings up a file information window allowing you to perform rename, delete, edit, type (choice of *Ascii* or *Hex* with forward and backward paging), add a comment file and set the deletion protection flag. You can select all the files on display for batch copying or deletion. Alternatively files can be matched to a pattern of characters or to before/since a date or day (eg DD-MM-YY, TUESDAY, YESTERDAY).

Hot Stuff

Zing! can display a file tree of any disk complete with a special notation to indicate which depth of directory relative to the root directory you have reached. Commands such as 'make directory' and 'install' can be quickly called up. The file system also provides copy, move, merge and rename functions with the same device gadgets and directory tree available for creating the relevant source and destination pathnames. As with AmigaDOS, comment files are not copied with files. Messages appear at all times to keep you up to date with the current operation. A 'continue or abort' message will appear if an operation proves impossible (e.g. a disk is write protected).

Sending files on to the printer is just as much a part of everyday computing as sending them to disk drives. The problem is that printers are slow devices and you have to wait around for them to finish. By selecting files for printing and then calling up the *Zing!* print spooler, you can set the print operation going and then literally place it in the background behind other operations you wish to carry out. The files will patiently queue for the printer's attentions without any intervention from you.

The *Zing!* file system displays the files as they are known to it. It is feasible that other operations may change the status of files so the 'update directory' option should be used to ensure that *Zing!*'s information is right

up to date. The fast sorted file display is made possible by 'zing' files, containing a form of indexing. These files are held on disk and you may wish to inhibit their creation on particular disks, a simple matter at the 'setting defaults' window.

Zing go the Strings of my Heart!

Zing! means that you needn't leave go of your beloved mouse although there is some typing of filenames and there are single key keyboard shortcuts and hot keys. The print spooler and screen dumps are invaluable as far as I am concerned but the file system is what you'll really buy *Zing!* for if you want an alternative to the CLI. I wouldn't call CLI 'mild mannered' as Meridian do, rather 'ill-mannered', making its master do all the work! *Zing!* takes over when the CLI sits back, letting you get more operations out of less typing, more information in less time.

Although *Zing!* duplicates many AmigaDOS commands, you probably won't want to dispense with CLI entirely – after all there are always batch files to write. *Zing!* actually uses some AmigaDOS commands so your Workbench disk shouldn't be far away and if you have a single drive system then the Zing! command files will have to be transferred into the c directory. A good 'once-over' of the manual – which wasn't of the highest standard, although we are told it will be reproduced on a laser printer – is all that is needed since *Zing!* can be learned as you go along. Crib cards and documentation become redundant in most respects.

Zing! can come hotfoot into a wordprocessing session or a spreadsheet or into a programming language when normally you would have to go and find your CLI window, if indded it proves possible to get back at all without closing down what you were doing. *Zing!* also comes to the rescue if non-Workbench files abound and you aren't about to learn all the CLI commands off by heart. In a perfect world Workbench would do all this. *Zing!* takes a more practical approach and succeeds in making AmigaDOS a more viable working environment.

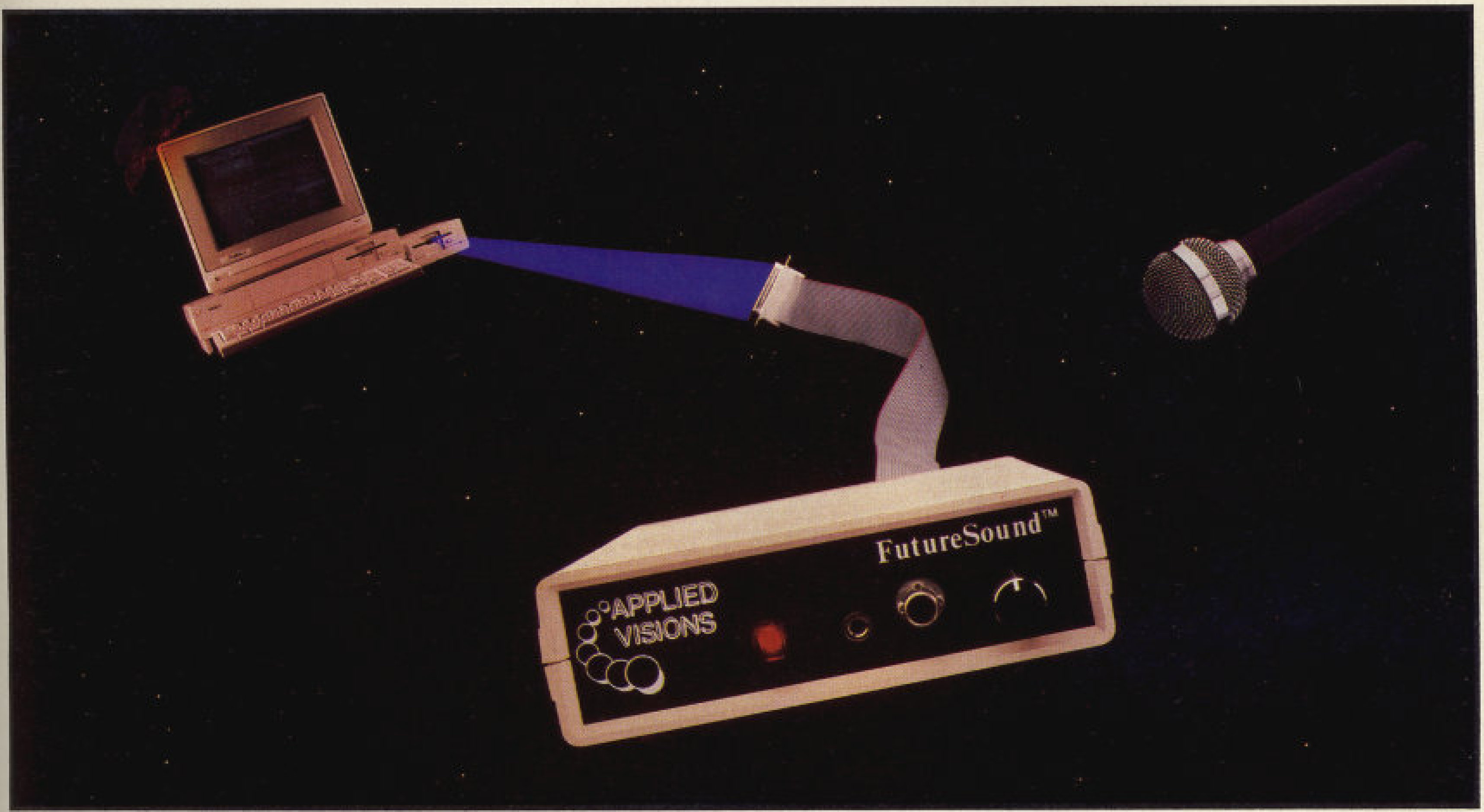
Meridian president, Jerry Farmer, tells us they they plan to update *Zing!* on the advice of users, that they offer a technical hotline and respond to written enquiries. A further product *Zing!Keys*, an Amiga keyboard enhancer which enables the user to assign macro and hot keys, is now due for release.

Touchline:
Name: *Zing!* ***Price:*** *$79.95 ($8.00 p+p).* ***Machine:*** *Amiga.* ***Supplier:*** *Meridian Software.*

New Start

The new version of *Kickstart* was creeping out into Commodore Amiga dealers at the time of writing. In the meantime software has been appearing with patches for 1.1 versions of *Kickstart*. Zing! however, is an example of new software which requires *Kickstart* version 1.2 to work, a potentially frustrating situation which users should be able to resolve by contacting a local dealer.

FutureSound™



"Open the pod bay doors, HAL..."

Programmers cast their vote!

Right now, leading software developers are hard at work on the next generation of Amiga® products. To add the spectacular sound effects we've all come to expect from Amiga software, they are overwhelmingly choosing one sound recording package... FutureSound. As one developer put it, "FutureSound should be standard equipment for the Amiga."

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FutureSound transforms your Amiga into a powerful, multi-track recording studio. Of course, this innovative software package provides you with all the basic recording features you expect. But with FutureSound, this is just the beginning. A forty-page manual will guide you through such features as variable sampling rates, visual editing, mixing, special effects generation, and more. A major software publisher is soon to release a simulation with an engine roar that will rattle your teeth. This incredible reverberation effect was designed with FutureSound's software.

APPLIED VISIONS

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Your Amiga dealer should have FutureSound in stock. If not, just give us a call and for £195.50 in cash with order we'll send one right out to you. Ahead warp factor one!

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Amiga Games

There's nothing like sophisticated graphics and sound to enhance a game and the Amiga has both. But does the latest selection of games live up to this potential?

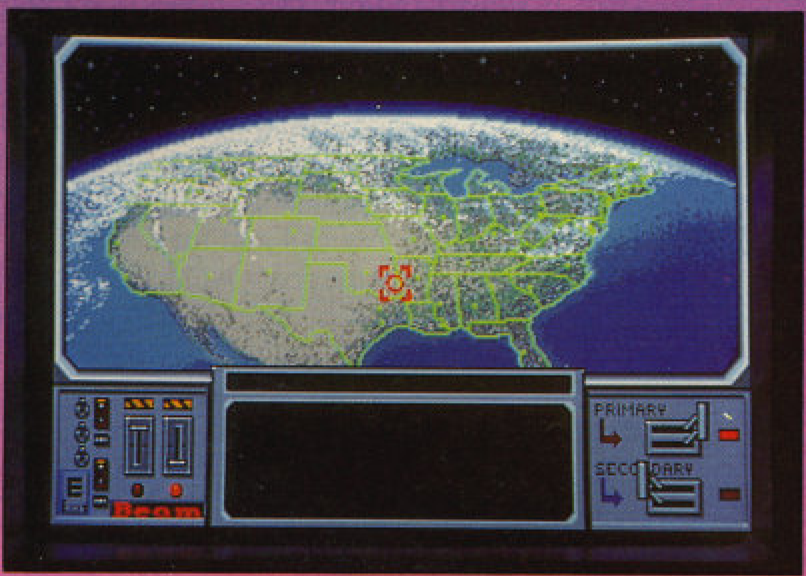
S.D.I.

Now we all know what nasty bounders those Russian chappies are. They only have one aim in life, and that is to bring about a state of global communism with as much vicious brutality as in inhumanly possible.

What a good thing it is then tht we have our heroic American cousins who are bravely prepared to fight for truth, freedom, apple pie, and the American Way. In S.D.I., one of the first offerings in Mindscape's Cinemaware range (allegedly giving players a more 'adult' experience), you, dear reader, play one Sloan McCormick, Captain of the US Orbital Marines, whose task it is to save the human race.

This, it must be said, should be easily accomplished before lunch. It is simply a matter of preventing a group of 'KGB-led fanatics' from starting a nuclear war. The redoubtable McCormick must destroy all KGB attack fighters, defend America from missile strikes, and rescue his beautiful Russian lover from a 'barbaric KGB torture squad'.

Judging by the picture in the accompanying booklet, I would be tempted to leave her to her hideous fate, and nip off in my Starfighter for a couple of Budwiesers.



Although the scenario is one of the worst I have ever read, the actual game isn't quite that bad. Admittedly there is very little gameplay, but countered against that are some spectacular graphics and sounds that would not be out of place in Star Wars. The animation too is excellent, particularly during the section where little user participation is necessary.

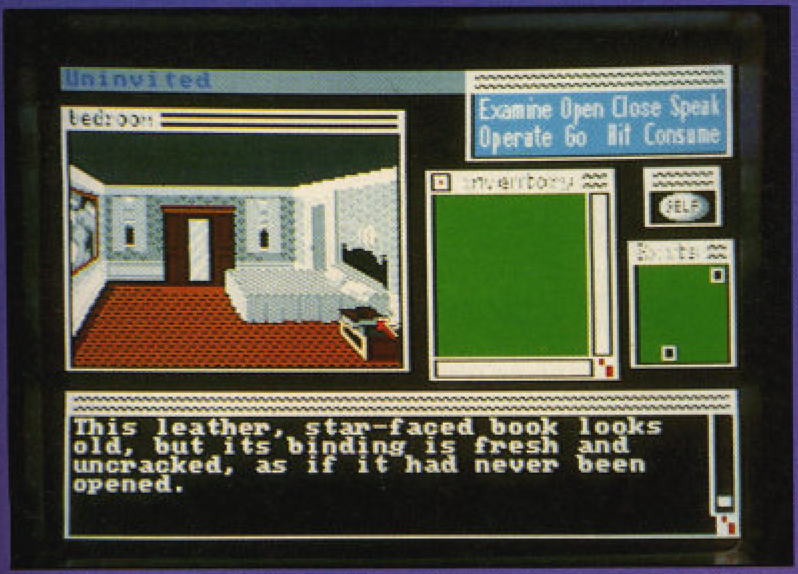
Overall, S.D.I. is a very American game. To describe it as gung ho would be the biggest understatement of the year. If you can ignore the politics you might find a good game, I just couldn't keep going for that long. **G.D.**

Touchline
Name: *S.D.I.* ***Supplier:*** *Mindscape.* ***Machine:*** *Amiga.* ***Price:*** *£39.95.*
Originality: *6/10.* ***Graphics:*** *6/10.* ***Playability:*** *5/10.* ***Value:*** *4/10.*

Uninvited

Mindscape, the company that brought such adventure classics as Deja Vu and the King of Chicago, has combined again with Alert, to create a new classic, Uninvited. Gamers familiar with Deja Vu will immediately feel at home. Lots of windows, full mouse control, and lavish descriptions all add up to create a game which is the computer equivalent of a good Dashiell Hammet novel.

In this particular game, you take on the role of a car crash victim, left alone in the countryside, with only a large house in view. As you approach the house, which in fact turns out



to be more of a gothic monstrosity than a semi-detached, an eerie feeling comes over you, one which is forcefully confirmed when the front door slams shut (and locked) immediately after you enter.

Walking around the house, it became clear that this is by no means your average bed and breakfast, especially with shadows lurking in every corner. To make the most of the feeling of impending doom, Mindscape has included a whole host of digitised sound (most of which are stereo on the Amiga) ranging from creaking doors to horrific screams – sounding something like me when forced to watch Bullseye.

The graphics are not spectacular, particularly by Amiga standards, but they do serve their purpose, which is to add the feeling already created by the text. This is not a game for inexperienced adventurers. It may be simple to play, but it is not easy to beat. Many hours spent with my mouse and I have still yet to beat the maze, a part of the game which is so infuriating as to have forced me to turn the machine off in a rage!

One American sci-fi magazine voted Uninvited the equivalent of an Oscar, and it is obvious why. The game is a classic of the graphic-adventure genre. I am never one to knock British adventures, but this game puts into the shade all but the very best Level 9 and Magnetic Scrolls games. If you like adventures, you had better not miss Uninvited.

G.D.

Touchline
Name: *Uninvited.* ***Supplier:*** *Mindscape.* ***Machine:*** *Amiga.*
Originality: *8/10.* ***Graphics:*** *7/10.* ***Playability:*** *9/10.* ***Value:*** *9/10.*

Chessmaster 2000

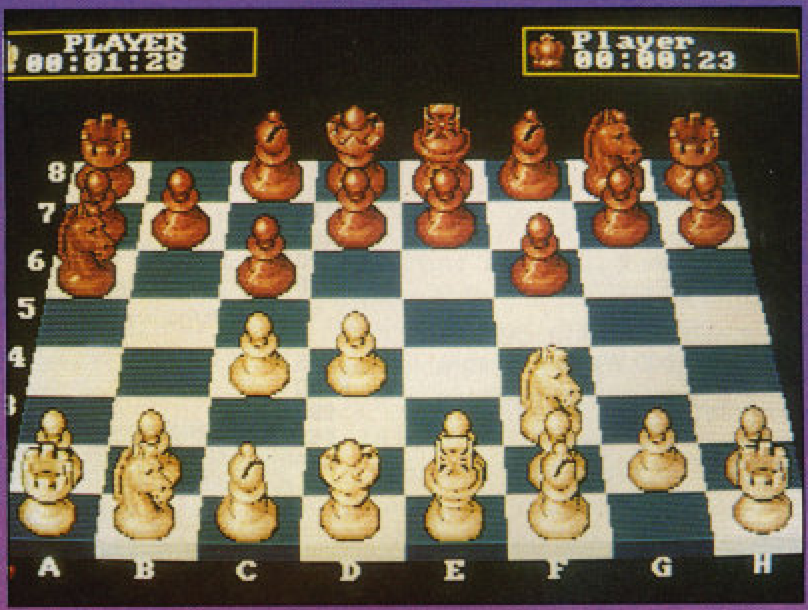
Every computer needs its chess game and Chessmaster 2000, by the Software Toolworks, is the outstanding offering for the Amiga. There are two elements to the computer chess game, the aesthetic and the practical. Chessmaster scores hightly on both.

A beautifully presented game, Chessmaster almost overkills on options. Choose two or three dimensional display, rotation of the board, board co-ordinates on or off, voice, music, bell or silence. The pieces are finely drawn. Swap between wood or metallic finish, define all colours precisely with slider controls.

The display is a joy to look at and all the options are selectable from pull-down menus. In general, Chessmaster is impressively programmed in the Amiga style. It's fast too, often continuing to play computed moves while the player chooses a menu option.

You can choose your opponent, human or Chessmaster or watch an autoplay game. You can choose to play black or white, to show captured pieces or to have chess clocks on screen. Newcomers have their own style which forces 'easy mode' on. There are normal coffee house and best move styles and you can have the 'opening book' on or off. You can choose from levels one to 12 (level 1: 60 moves, five minutes; level 12: one move, 6000 minutes). During play you can force the computer to make a move, take a move back or replay it.

You move a piece by dragging it into position with the hand icon. Grey silhouettes will indicate possible valid moves, turning red to indicate a possible capture. Chessmaster won't let you make an invalid move. You can file away your own games on disk (load, save and erase) and there are an amazing 100 games in the 'classic games' directory for retrieval and move by move replay or analysis.



Those who like to get serious about their chess will be happy to learn that Chessmaster does too. Chessmaster 2000 was winner of the 1986 US Open personal computer chess championship.

Each game is recorded so all moves can be replayed, taken back and analysed from any position. An analysis can be saved to disk, moves displayed or printed out as you play, or on completion of the game. You can set up any position, ask for suggested moves and best variations. Chessmaster will solve to mate for either player or give an indication of how long you've got left! You can even watch Chessmaster 'thinking' although this display obscures too much of the board for my liking. I'd prefer to have both.

Chessmaster has the range of options to keep the serious beginner, occasional player or club competitor happy. Bill, Raymond and Jeremy could happily use it to liven up chess analyses on television and I bet Gary Kasparov would like to get his hands on an Amiga for his Black Sea chess centre!

A.O.

Touchline
Name: *Chessmaster 2000.* ***Price:*** *£29.95.* ***Machine:*** *Amiga.*
Supplier: *Electronic Arts.*
Originality: *5/10.* ***Graphics:*** *9/10.* ***Playability:*** *9/10.* ***Value:*** *9/10.*

Executive Amiga

Does the Amiga live up to its claims to be a business machine? And if so, is there sufficient software support?

By Anne Owen

Is it, or isn't it? The A2000 is supposed to be and the A500 is supposed not to be. I'm talking of course about 'a business computer'. Commodore, embarrassed by the combination of graphics and sound (games) and multitasking operating system (business), have sorted out their marketing by splitting the A1000 into two.

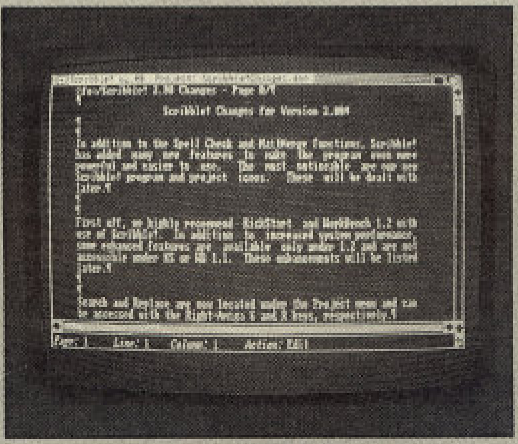
The A2000 now has Amiga and IBM slots capable of taking, respectively, business peripherals and processors able to run traditional business software. We are yet to find out if this latter feature is just a get out clause for those who never lost their jobs by buying IBM. And does it matter anyway as long as it sells Amigas?

In the meantime those of us who need no excuses have been getting to know some of the excellent software available for the Amiga office. All of it will run on the A500 as well as the A1000 and A2000.

Workers Unite

Many computers have desktops. On the Amiga you sit at a *Workbench*. The *Workbench* has the available tools laid out on it. If *Analyse!* spreadsheet is in one disk drive and your disk titled 'Spreadsheet Data' is in the other then two disk shapes (icons) with these titles wil appear on screen.

To click on an icon you place the mouse controlled pointer over it and you press the left mouse button twice. If you click on the Analyse! disk it will open a window and display its contents, the program itself, any utilities associated with it and any data neatly stored away in named 'drawers'. Each item has its own icon picture so you can't mistake its purpose. To check the contents of drawers you click on the appropriate icon. A further window will appear with its files and perhaps more drawers to open and inspect. A filing cabinet by any other name but no need to move from your bench!



When you click on a program icon, say the *Scribble!* word processor, it will create its own working environment on the screen. *Scribble!* has its own pull-down menus, a place to type your work and requesters to ask you what you want to do next, the name you wish to give your text file and the drawer to put it in when you save it. Everyone, however little they know about computers, will be able to use a package like *Scribble* within minutes. Online 'help' files mean that only the finer points of use will have to be looked up in the manual (which is nevertheless extremely comprehensive). The *Plan* series of software and Grafox's *Logistix* both feature disk based help files. So Amiga business software presents a friendly face.

More Than Two Hands

The Amiga is capable of running more than one such program at the same time. With the 512K machine this is more showing off than practical. More useful and more lively, you will want to run a menial task like backing up a drawer of valuable files while continuing with your spreadsheet or database. If you are running *Analyse!* or *Organise!* or *Superbase*, all you have to do is reduce the size of the window containing the program and click in the *Workbench* screen which is revealed behind. You can create a backup drawer by simply renaming an empty drawer icon. Now click once on your drawer (full of files) and, holding down the left mouse button, drag it over to the drawer named 'backup'. At this point you let go of the left button. *Workbench* now knows that you want to copy one drawer into the other. You can now return to your previous task, resizing the window again as required.

Workbench is very easy to use but it has its weaknesses. Suppose you wanted to print a document or series of documents. There is no printer icon on the *Workbench* to which you could move your document drawer. Programs such as *Scribble!* will help you out with printing tasks but some are not so helpful and you may have to learn some *AmigaDos* commands or turn to a utility such as *Zing!* which provides printing in the background.

Office Soft

All the major business applications are available for the Amiga. The new 2.00 version of *Scribble!* from Micro-Systems Software is now a very good wordprocessor and can shoulder the hard work demanded of this essential office tool. The mail merge feature is neatly implemented although more information about how to interface it with database files would be helpful. The spelling checker, with a 30,000 word dictionary and a simple way to 'teach' the dictionary new words, is fast enough to encourage its regular use.

Scribble! also proves the real usefulness of multitasking by allowing the writer to have up to four documents open on screen at the same time. The cut, copy and paste tools all work across the documents so you can combine the hard thought-out wording of your sales brochure into your latest mailshot by just copying it over.

A range of paper handling and text formatting commands can be inserted into the text, variable strings inserted automatically from specified disk files or prompts generated for input from the keyboard. These features are the key to the modern requirement of 'personalising' correspondence. Now all you need is a laser printer to do justice to the different styles of text that you can see on screen. Styles can be changed at any time without rekeying.

Still with Micro-systems Software, the *Analyse!* spreadsheet makes excellent use of the Amiga's user interface. I find it very easy to both enter data and manipulate the layout using the mouse as a pointer. You can insert and delete columns and rows simply by making a selection with the mouse. Labels can be set out over multiple column widths for legibility. Moving and copying is achieved by wielding the mouse and paint roller icon to highlight the data required and pointing to where it should go. Dead easy.

Keyboard "/ commands" and pull-down menus provide access to the functions. *Analyse!* features a large array of functions, a macro language for automating your work and a neat set of graphs which are generated from selected data sets. The graphs are controlled from a pull-down menu in *Analyse!* and do not require a separate utility. The business person will find the software easy to get used to and the excellent manual will guide them into the more powerful features. Its 200 pages, spiral bound, immacutely typeset with example screens, glossary, index and appendix on the latest features. It reflects the all round quality of *Analyse!* and I was most impressed.

Superbase is the main contender in the database stakes and we previewed it in the first *Your Amiga*. Its special ability to handle external files containing graphics is not the only factor that sets it apart in quality from other database software so far encountered. There are a variety of ways provided to display your data as well as sophisticated searching, sorting and indexing functions.

Because it's the Amiga, it's worth looking at business presentation graphics. If you want to take presentation graphics a step further than the integrated graphs of *Analyse!* then *Aegis Impact* is designed for you. It provides a whole range of graph types to represent your data. Other paint packages do have clip art to help the creation of graph images but *Impact* is purpose designed. Once the images are created, you can 'program' a slide show to display them.

There remains the problem of presenting the finished product. The computer itself may not always be available. The *Polaroid Palette* is an expensive solution if 'one off' graphics are required. A company that is already producing business graphics on slide, from a client brief or from IFF format supplied screens, is Phoenix (Tel: 0733 76896). Triangle Television (01 874 3418) will even help you produce a video if that's what is required. A colour printer is expensive for a one-off but a model such as the Xerox gives remarkable results if hard copy is a requirement. A cheaper alternative is the Okimate 20.

Communications

A quick word on electronic mail, now a very real requirement of a business computer. The Amiga can shine in this department with a number of public comain programs to give you a taste and with *A-talk* the outstanding commercial program from America. *A-talk* will combine with the appropriate modem to take you on to Telecom Gold or One to One and will help automate the process of dialling and logging on. If you want to access American electronic databases then *A-talk* is ideal.

Data

Data integration remains one of the weak points of the Amiga compared to some of its (much more expensive) rivals. As yet there is no 'clipboard' for cutting and pasting data between programs.

An interesting feature for the business user is the ability to incorporate data from IBM compatible software. A special program can read the data and write it back to an Amiga format disk. *Analyse!* has a 'load Lotus 123' option for such circumstances. It's very 'round the houses' by this method. The A2000 tackles the problem seriously with its 8088 co-processor and offers cut and paste between *MSDOS* and *AmigaDOS* as they operate side by side in separate screen windows.

One further problem which you might encounter as an Amiga executive is the storage media. The 3.5" disks are robust but the Amiga drives seem especially unforgiving. Frequent backing up of data is essential. Note that both *AmigaDOS* and *Workbench* rely on program code stored on disk. A single drive system will require the frequent swapping of disks. If you foresee large amounts of data being handled by your business application then look seriously at a hard disk from the beginning. Like *GEM*, *Intuition* is made for hard disk.

Touchline

__Name:__ Scribble! __Price:__ £99.95 __Name:__ Analyze II. __Price:__ £149.95. __Machine:__ Amiga. __Supplier:__ Micro-Systems. __UK dealer information:__ Vision Technologies Ltd, 53-59 High Street, Croydon, Surrey. __Tel:__ 01 760 0013.

Touchline

__Name:__ Superbase. __Price:__ £129.95. __Machine:__ Amiga. __Supplier:__ Precision Software. __Tel:__ 01 330 7166.

Touchline.

__Name:__ Impact. __Price:__ £64.95. __Machine:__ Amiga. __Supplier:__ Aegis Development, 2115 Pico Boulevard, Santa Monica, CA 90405. __Tel:__ 1 213 392 9972.

Listings

Get it right first time with our deluxe program system for the C64.

You may have noticed that our listings are free of those horrible little black blobs which send you searching around the keyboard for a suitable graphic symbol. You may also have noticed the funny numbers by the side of each line of the listing. Fret no more, it's all part of our easy entry aid.

Instead of those nasty graphics and rows of countless spaces in PRINT statements and strings we use a special coding system. The code, or mnemonic, is always contained in square brackets and you'll soon learn to decipher their meanings.

For example, [SA] would mean type in a Shifted A, or an ace of spades in layman's terms, and [SA10] would mean a row of ten of these symbols.

[S+2] means hold down the shift key and press the plus key twice. It doesn't take a great leap of logic to realise that [C+2] means exactly the same thing except that the Commodore key (bottom left of the keyboard) is held down instead of the shift key.

If more than two spaces appear in a statement then this will be printed as [SPC4] or, exceptionally, [SSPC4]. Translated into English this means press the spacebar four times or in the latter case hold the shift key down while you do it.

A string of special characters could appear as:
[CTRL N, DOWN2,LEFT5,BLUE, F3,C3]

This would be achieved by holding down the CTRL key as you press N, press the cursor key down twice, the cursor left key five times, press the key marked BLUE while holding down the CTRL key, press the F3 key and, finally hold the Commodore key down while pressing the number two key (C2 would of course make the computer print in brown).

Always remember that you should only have a row of graphics characters on your screen with no square brackets and no commas, unless something like this appears:
[SS],[C*]
In this case the two characters should have a comma between them.

On rare occasions [REV T] will appear in a listing. This is a delete symbol and is created by entering the line up to this mnemonic. Then type a closing quotation mark (SHIFT & 2) and delete it. This gets the computer out of quotes mode. Hold down CTRL and press the number nine key (RVSON), type the relevant number of reversed T's and then hold down CTRL and press zero (RVSOFF). Next type another quotation mark and delete it again. Now finish the line and press RETURN.

A list of these special cases is given in the table but remember that only one of these mnemonics will appear outside of a PRINT string: the symbol for pi. This may appear when its value is needed in a calculation so this may look something like:

:CC=2*[PI]*R:

Ignore the square brackets and just type in a shifted upward pointing arrow (ie. the pi symbol).

```
PROGRAM: SYNTAX CHECKER

5 REM SYTAX CHECKER - ERIC DOYLE

10 BL=10    :LN=70    :SA=49152
20 FOR L=0 TO BL:CX=0:FOR D=0 TO
 15
30 READ A:IF A>255THENPRINT"NUMB
ER TO LARGE";LN+(L*10):STOP
40 CX=CX+A:POKE SA+L*16+D,A:NEXT
 D
50 READ A:IF A><CX THENPRINT"ERR
OR IN LINE";LN+(L*10):STOP
60 NEXT L:SYS 49152:NEW
70 DATA 173,5,3,201,165,208,31,1
20,169,9,141,32,208,141,33,208,1
847
80 DATA 169,7,141,134,2,169,13,3
2,210,255,169,64,141,4,3,169,168
2
90 DATA 192,141,5,3,88,96,120,16
9,124,141,4,3,169,165,141,5,1566

100 DATA 3,169,14,141,134,2,141,
32,208,169,6,141,33,208,88,96,15
85
110 DATA 32,124,165,72,138,72,15
2,72,162,0,165,20,133,254,165,21
,1747
120 DATA 24,101,254,133,254,189,
0,2,240,18,69,254,133,254,232,18
9,2346
130 DATA 0,2,240,8,24,101,254,13
3,254,232,208,233,169,1,141,134,
2134
140 DATA 2,165,254,74,74,74,74,3
2,156,192,32,210,255,165,254,41,
2054
150 DATA 15,32,156,192,32,210,25
5,169,13,32,210,255,169,13,32,21
0,1995
160 DATA 255,169,7,141,134,2,104
,168,104,170,104,96,24,105,48,20
1,1832
170 DATA 58,16,1,96,24,105,7,96,
0,0,0,0,0,0,0,0,403
```

by Eric Doyle

Checksum Program

The hexadecimal numbers appearing in a column to the left of the listing should not be typed in with the program. These are merely checksum values and are there to help you get each line right. Don't worry if you don't understand the hexadecimal system, as long as you can compare two characters on the screen with the corresponding two characters in the magazine you can use our line checking program.

Type in the Checksum Program, make sure that you've not made any mistakes and save it to tape or disk immediately because it will be used with most of the present and future listings appearing in Your Commodore.

At the start of each programming session, load Checksum and run it. The screen will turn brown with yellow characters and each time you type in a line and press the RETURN key a number will appear on the screen in white. This should be the same as the corresponding value in the magazine.

If the two values don't relate to one another, you have not copied the line exactly as printed so go back and check each character carefully. When you find the error simply correct it and press RETURN again.

If you want to turn off the checker simply type SYS49152 and the screen will return to the familiar blue colours. You can then do whatever it was you wanted to do and if this doesn't use the area where Checksum lies you can go back to it with the same SYS command.

No system is foolproof but the chances of two errors cancelling one another out are so remote that we believe our listings are more reliable than any other magazine in the world. So get typing! YC

Mnemonic	Symbol	Keypress
[RIGHT]		CRSR left/right
[LEFT]		SHIFT & CRSR left/right
[DOWN]		CRSR up/down
[UP]		SHIFT & CRSR up/down
[F1]		f1 key
[F2]		SHIFT & f1 key
[F3]		f3 key
[F4]		SHIFT & f3 key
[F5]		f5 key
[F6]		SHIFT & f5 key
[F7]		f7 key
[F8]		SHIFT & f7 key
[HOME]		CLR/HOME
[CLR]		SHIFT & CLR/HOME
[RVSON]		CTRL & 9
[RVSOFF]		CTRL & 0

Mnemonic	Symbol	Keypress
[BLACK]		CTRL & 1
[WHITE]		CTRL & 2
[RED]		CTRL & 3
[CYAN]		CTRL & 4
[PURPLE]		CTRL & 5
[GREEN]		CTRL & 6
[BLUE]		CTRL & 7
[YELLOW]		CTRL & 8
[POUND]		£
[LARROW]		←
[UPARROW]		↑
[PI]		SHIFT & ↑
[INST]		SHIFT & INST/DEL
[REV T]		see text
[Cletter]		CBM + letter
[Sletter]		SHIFT + letter

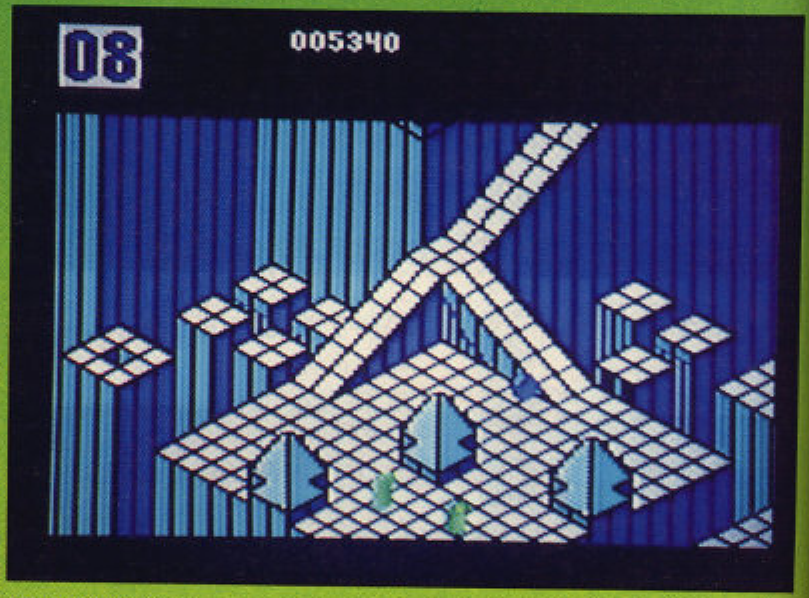
Coin-Op Conversions

Many of the most popular computer games were originally designed for arcade machines. We look at some of the most memorable old favourites and bring an update on the latest in this area.

By Tony Hetherington

Computer games as we know them began life in the arcades and since then the software houses have often taken their leads from their coin-op cousins. It all started at an easy pace with *Pong* providing the game that sold many home game machines. Then came *Space Invaders, Asteroids, Breakout, Defender* and *Pacman* with conversions appearing for all micros including the C64 as both computers and coin-ops discovered colour (the early coin-ops had black and white screens with coloured strips stuck over them). Now C64 owners can get their own copy of games like *Nemesis, Paperboy* and *Gauntlet* and even video disk games such as *Dragon's Lair!*

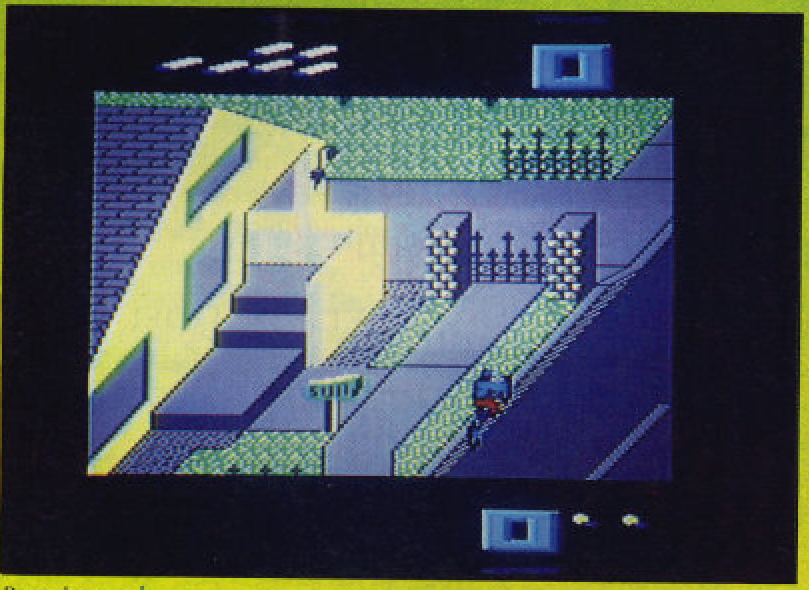
Most coin-op conversions are surprisingly good when you consider that the arcade machines have hardware and graphic specifications that would put the Amiga to shame such as a 68010 processor and about two megabytes of memory!



Marble Madness

Elitism

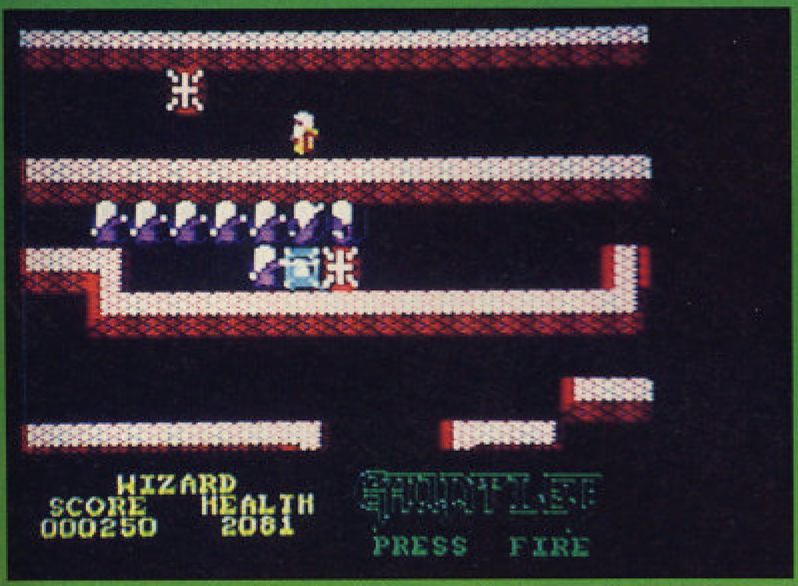
One software house that has made its name in coin-op conversions is Midlands based Elite, well known for chart busters such as *Commando, 1942, Ghosts and Goblins, Bombjack* and, of course, *Paperboy* and *Space Harrier.*


Paperboy

Paperboy is one of my favourite coin-ops and my first call whenever I'm in an arcade. The unique gameplay consists of delivering copies of *The Sun* to subscribers while avoiding an army of drunks, skate boarders, motorists, workmen and animals that are determined to wreck your BMX bike. You can tell the difference between subscriber's houses and the others as your readers have bright clean houses whereas the others are dark, cobweb ridden hovels and you even get bonuses for breaking windows by hurling your papers through them. I wonder how many other people practise on the computer game so they can amaze them in the arcades.

Bombjack was in fact a bigger hit on the C64 than it was in the arcades and has prompted a sequel. Unfortunately, *Bombjack II* restricts the leaping hero of the original to straight left, right, up and down movements and the game to a limited platform game.

Space Harrier is perhaps one of Elite's most ambitious conversions since the C64 can't hope to match the coin-op's stunning graphics. Although these look like a poor pale



Gauntlet

imitation, the game retains the frantic flavour of the ultimate shoot 'em up.

Commando was the first controversial coin-op conversion as Elite took a dim view (and threatened legal action) over Alligata's *Who Dares Wins II* which was surprisingly similar to and the gungho gameplay of this 3D shoot everything that moves game. This was the first coin-op to be officially licensed instead of a general free for all with the closest to the original attracting the threat of a lawsuit from the likes of Atari taking out full page adds to threaten everyone. In the end *Commando* topped the charts (*Who Dares Wins II* didn't) proving the original will win in the end.

Cloning

Two other games that suffered similar clone fever were *Marble Madness* and *Gauntlet*. These two hotly pursued licences, both resulting in amazing games, had to fight off clone competition launched before the official versions. At one point, is seemed that the market would be saturated with marble games such as *Spindizzy* (Electric Dreams) *and Gyroscope* (Melbourne House) and *Gauntlet* games such as *Storm* (Mastertronic), *Dandy* (Electric Dreams) and *Druid* (Firebird). But both official games did remarkably well, with *Gauntlet* taking the lucrative Christmas number one position.

Sport Simulations

Sports games have been few and far between in the arcades but those that have appered have had a dramatic effect on the software houses. Melbourne House captured the flavour of coin-op kung-fu games in *Way of the Exploding Fist* and started a craze that has lasted three years. It has since been followed by official conversions of *Yie Ar Kung Fu* (Imagine) and *Kung Fu Master* (US Gold).

The greatest influence has got to have been Konami's *Track and Field* that first sparked off the joystick waggling athletics that lead to *Daley Thompson's Decathlon* (Ocean), *Decathlon* (Activision) and of course the Epyx quartet of *Summer Games, Summer Games II, Winter Games* and *World Games!*

Atari's coin-op gold amazed the world and challenged programmers to create true 3D views of the course. This challenge was taken up by Ariolasoft who produced the incredibly accurate *Golf Construction Set*, in which you play on four real courses, and the hit and hope games of *Leader Board, Leader Board Tournament* and *Leader Board Executive*, imported from Access by US Gold.

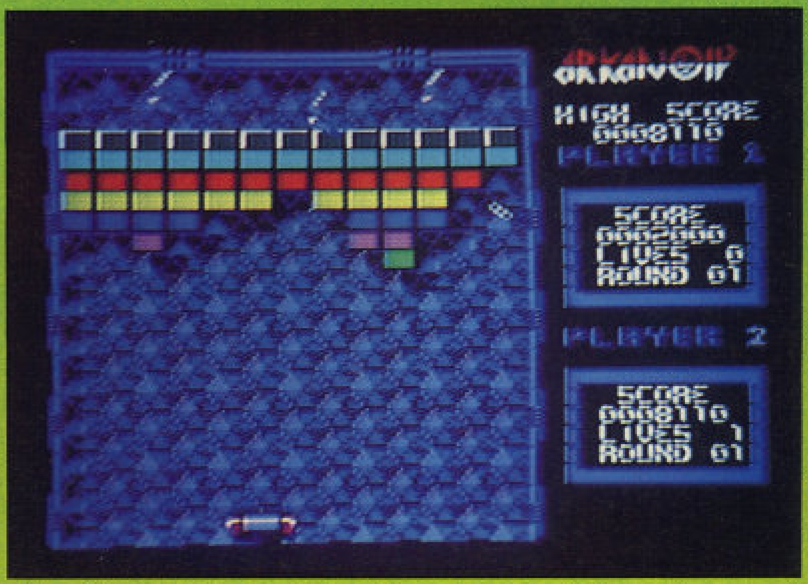
Graphic Displays

The most spectacular coin-op conversions must surely be *Dragon's Lair* and its sequel *Escape from Singe's Castle*. How could a humble C64 hope to mimic a video disc machine capable of producing cartoon quality graphics? The result was surprisingly accurate, helped by the simple gameplay in which left and right joystick movements decided whether the hero, Dirk the Daring survived another stage to rescue his princess or got fired, chomped, crunched or pummeled in the attempt. Curiously, I found the sequel to contain the more familiar screens including the perilous ride down the whirlpools and rapids, a frantic trip on a flying horse and a chase down a tunnel with a giant boulder just behind you.

Old Favourites

Just when you thought that things were progressing nicely via *Pong, Asteroids,* Kung-fu games, *Gauntlet, Paperboy* and *Dragon's Lair*, *Breakout* makes a comeback!

One of the early coin-ops is back as *Arkanoid.* Revamped, rewritten and reworked. The task of hitting a ball with a bat to break down a wall has become a lot harder as aliens get in your way and some bricks don't break but give you unusual features such as a double bat and glue makes the ball stick to the bat. Ocean has done the official version but Gremlin has produced a clone in *Krakout* that adds screen after screen of bricks that are patrolled by more active aliens that not only deflect the ball but also paralyse your bat and some even eat the ball and spit the bits at you!



Arkanoid

Infinite Variety

Indoor Games (Advance) features a compilation of indoor sports such as 10 pin bowling and darts and also air hockey, a machine that lurks in the corner of most arcades. The object of this amazing game is to guide a puck that hovers on a cushion of air into your opponent's goal without smashing your knuckles. Incredibly the computer version captures the

gameplay, the speed and smooth movement of the machine but without the pain.

There are one or two computer games that have actually managed to travel against the flow out of the arcades and have been converted into coin-op games! Broderbund's *Choplifter* was a hit on a variety of machines, including the C64, before it moved into the arcades where it was revamped and improved and is now almost unrecognisable thanks to its superior graphics.

The coin-op version of Activision's *Pitfall!* actually consists of a mixture of *Pitfall!* and its sequel *Pitfall 2* with added erupting volcanoes, lightening and other graphic effects.

Not many games make this transition as they have to be good enough to encourage people to pay 20p for a game (even though they might already have the computer version) and be quick enough to pack as many games (and 20ps) as possible into a day.

The coin-op conversions continue with three this month, *Nemesis*, *Express Raider* and *Gauntlet the Deeper Dungeons*.

Nemesis

Nemesis, an Earthlike world is under all out attack from its ancient enemies the bacterions. To save them you pilot the prototype Warp Rattler space fighter and duel to the death with the bacterions.

Your objective is the bacterion superfortress but first you will have to battle past screens and screens of enemy snakelike ships, gun towers, fighters, exploding rocks, tailed monsters and mother ships that have to be blasted four or five times down their central shoot before they shower you in missiles.

The action is based around bizarre landscapes in which deep space gives way to built up ships, strange pipe constructions, walls that must be blasted, platforms with giant heads and bone structures complete with grabbing skeletons.

As you reek revenge you'll be able to collect power capsules that wipe out the nasties on the screen and others that can be used to improve the Warp rattler. Collect enough and you can increase the ship's speed (and avoid a lot of trouble), equip the ship with air to surface missiles, double the fire power of the cannon, replace the cannon with a laser, protect the rattler with a shield and add up to two sidewinders. These have the same firepower as the rattler and form a tail behind your ship.

One of the best shoot 'em ups you're ever likely to play.

Touchline

Title: *Nemesis.* ***Supplier:*** *Konami.* ***Machine:*** *C64.*
Originality: *4/10.* ***Playability:*** *9/10.* ***Graphics:*** *8/10.* ***Value:*** *8/10.*

Express Raider

The wild west comes to your C64 in the conversion of the Data East "get the train" coin-op.

Bouts of Kung-fu are punctuated by gunfights from horseback as you battle to get to the front of the train. The Kung-fu takes place on top of each carriage in which you must punch and kick gun firing guards, shovel wielding stokers, assorted cowboys and coyotes (?). The battle must be won within a time limit otherwise a life is lost which means the pressure is on particularly against one opponent who hides behind a pile of boxes that must be punched and kicked away before you can tackle him.

On horseback you must shoot seven passengers in each carriage to advance to the next level. This isn't as easy as it sounds as your intended victims hurl bullets and knives at you.

Express Raider is somewhat disappointing and has nothing new to offer as it's little more than yet another Kung-fu game. Isn't it time for something a little different?

Touchline

Title: *Express Raider.* ***Supplier:*** *US Gold, Units 2/3, Holford Way, Holford, Birmingham B6 7AX.* ***Tel:*** *021 356 3388.*
Machine: *C64.*
Originality: *2/10.* ***Playability:*** *5/10.* ***Graphics:*** *6/10.* ***Value:*** *3/10.*

Gauntlet – The Deeper Dungeons

When the four player roleplaying action of *Gauntlet* appeared in the arcades the owners had to stop people playing the game so they could go home at night. It was also the first machine to have a slot to take the pound coin as players shovelled money in to keep their character alive.

The game was successfully converted for the C64 and included all 512 levels. Now here's the sequel and another 512 levels for Merlin the wizard, Questor the elf, Thor the warrior and Thyra the valkyrie to explore and plunder.

The deeper dungeons load in from the original game (which you must have) and feature the same combination of monsters, magic and mayhem in which the players must fight ghosts, goblins, deaths, lobbers and sorcerers to get to treasure, potions and invisibility amulets.

Some of these new levels have been designed by Gauntlet players as entries in a design a dungeon competition and are particularly nasty. For example, one screen begins with a duel with six deaths, another an assault by lobbers and all have an unhealthy stock of poisoned food.

If you enjoyed the original *Gauntlet* (if not, why not?) then you'll relish another 512 levels which could be training for things to come as *Gauntlett II* is now in most arcades.

Touchline

Title: *Gauntlet – The Deeper Dungeons.* ***Supplier:*** *US Gold, Units 2/3, Holford Way, Holford, Birmingham B6 7AX.* ***Tel:*** *01 356 3388.* ***Machine:*** *C64.* ***Price:*** *£4.99.*
Originality: *4/10.* ***Playability:*** *9/10.* ***Graphics:*** *7/10.* ***Value:*** *9/10.*

Coin-op conversions will continue to top the charts as more and more games join the ranks on your C64. The next big game is likely to be *Quartet* from Electric Dreams, a four player *Gauntlet* style science fiction game which will be joined by *Super Sprint* for car racing fans.

US Gold is preparing a trio of conversions featuring the heroics of Indiana Jones in *The Temple of Doom*, the cartoon capers of *Road Runner*, as he escapes the attempts of Wile E. Coyte to turn him into fast food, and finally *Metro Cross* which is a desperate race against time across an assault course packed full of springs, giant wheels and spiked holes that try and separate you from your trusty skateboard. YC

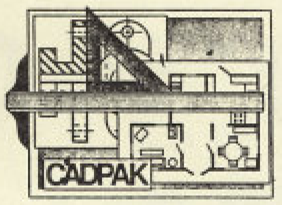
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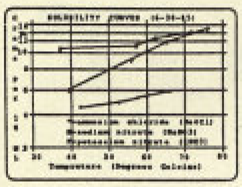
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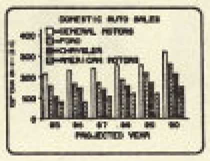
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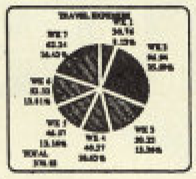
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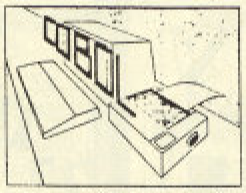
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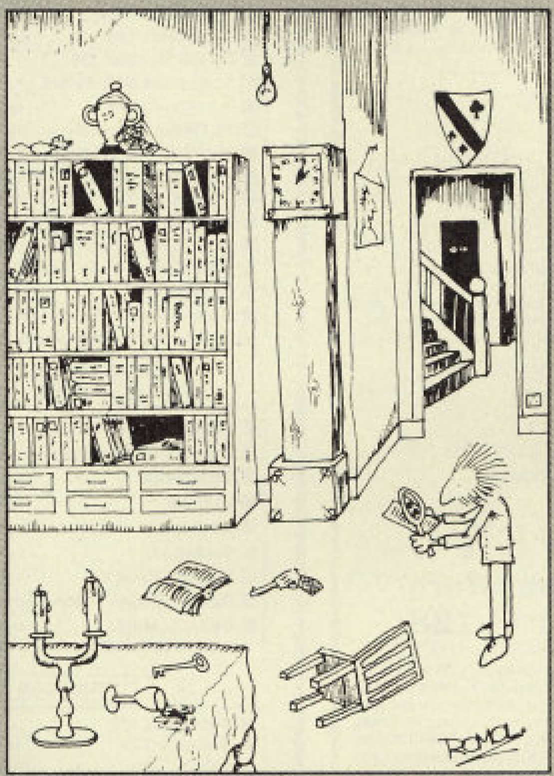
The Mystery of Arkhan Manor

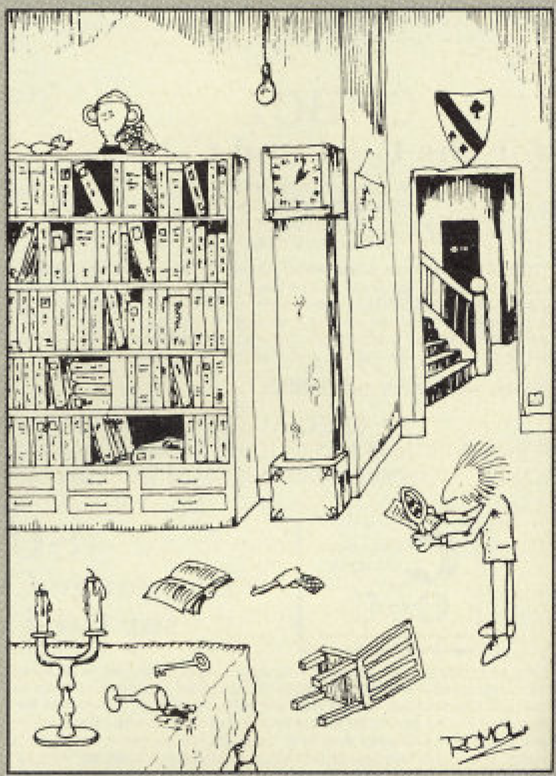
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....

Number of differences found ....

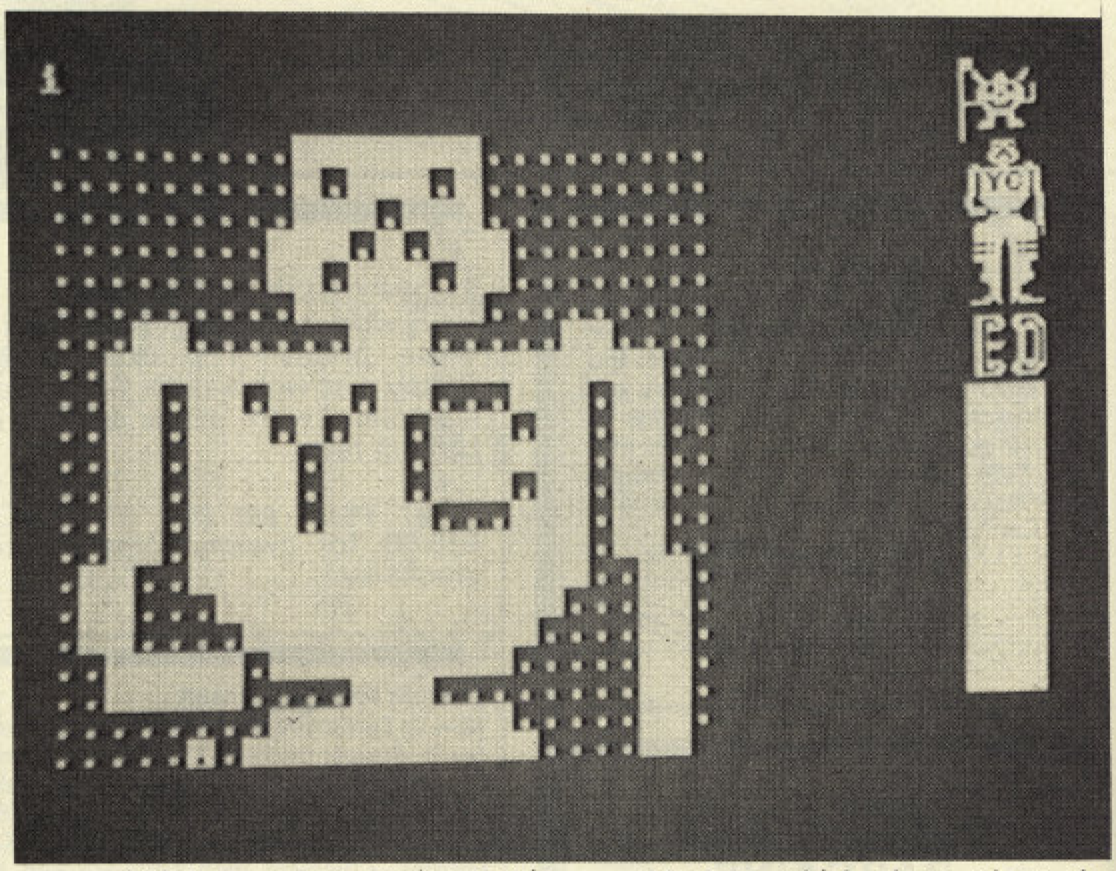
Please send your entry to: Arkhan Manor Competition, *Your Commodore,* 1 Golden Square, London W1R 3AB. Closing date: Friday 31 July 1987.

Programmers Package

Speedipen and Programmer's Utilities are two new products from JCL Software. Do they come up to scratch?

By Allen Webb

JCL has recently launched two new software utilities. *Speedipen* is a word-processing package whilst *Programmer's Utilities* brings you three different ways to improve your own programs.



Speedipen

As implied by its name, *Speedipen* is a word processor package. It was originally available on disk but has now been converted to cartridge. The area of word processors is fraught with difficulties since, in my experience, a word processor is a very personal item about which one readily evolves preferences and prejudices. It is, therefore, difficult to review a word processor objectively. At under £20, *Speedipen* is clearly in the budget area and must be considered in that light.

The one virtue of cartridge based software is that it boots up automatically without bother or delays. *Speedipen* is in this category and after a mildly self-indulgent opening display, an opening Help screen appears.

On first impression it seems that no effort has been spared to make help readily available so that you can perform most general functions without constant recourse to the manual.

Facilities

The big pain when using a WP on the 64 is the limitation of 40 character screen width. Software writers tend to adopt one of two solutions:

1. The edit screen uses 40 character width but you can preview text in its correct form before printing.
2. The use of What You See Is What You Get (WYSIWYG) format with the screen acting as a window on the document.

Speedipen uses the latter option in a fast and effective manner. My personal preference is for the first approach, mainly because it makes the check reading of the document simple. It's really a question of taste.

The author of *Speedipen* seems to have adopted a happy balance when it comes to the features embodied in the package. the usual options for text format are available; justification, centering, tabs, word wrap.

Markers which show where the pages start and end are provided but there are no options for adding footers or headers. The usual options for moving and deleting blocks of text and word searching are also provided.

One welcome feature is the provision of a built in Centronics driver which allows the use of parallel port printers without aggravation. My main grouse is the repeated request for information during data handling and other options. Whilst I applaud the provision for drive numbers for those with twin disks, a global hardware option would reduce key pressing.

As a budget WP, this package has most of the options I would expect. It

is both fast and efficient without any obvious bugs and I would recommend it to anyone wanting to start handling text in a serious manner.

Programmer's Utilities

To someone, such as myself, who enjoys hunting through public domain and similar compilations of software, the next item offered great attraction. This is a collection of three programmer's utilities. I should add that these are definitely not public domain.

There are three machine code utilities, two to aid Basic programming and one to aid machine code programming. First we have an item called *Stepping Stones*. This is a machine code monitor of sorts which allows you to step through code so that bugs can be identified. Traps based on register values can be set and you can identify subroutines which, since you know they are bug free, can be skipped at normal speed. Whilst this is useful, it does lack features which would make it more valuable. I would have liked the options to disassemble code, read tables of ASCII values and change portions via a simple assembler. There are a number of excellent products in this field offering stiff competition, and on its own, *Stepping Stones* doesn't quite make it.

The next item is called *Spritey*. This is an interrupt driven routine which makes control of sprites trivial. When your program is running, the routine scans five integer arrays and acts according to the values to position the sprites, colour them etc. The sprite designs are actually held within the code and a rudimentary sprite designer is provided. It does seem possible, however, to access other designs by directly changing the sprite pointers. I loved the method of controlling the sprites but disliked the sprite designer.

The adopted approach is to place the machine code starting at the normal start of Basic and to raise Basic above the code. This means that you can easily integrate the code in your program.

Finally, we have a snippet called *Baby Business Basic*. Those who wish to write business software such as databases will encounter the need to input a lot of data in an idiot-proof manner. Where you have a formatted screen, the code (in Basic) to input data from the various fields used is large. This item is a machine code bundle which provides many such functions via simple commands. The commands include inputting from specific fields, setting up fields, getting bomb-proof inputs and file handling. The syntax of the commands are generally simple allowing you to write involved programs easily. I found this item to be the best of the bunch and very handy.

Overall, I had one big complaint. The instructions were supplied via a large HELP program and commented demos. I prefer an instruction booklet. If you are in the middle of a large program, the last thing you want is to load a demo or other program and, by use of a pencil and paper, try to sort things out. At £18, this package is also a touch pricey.

Touchline

JCL Software: 47 London Road, Southborough, Tunbridge Wells, Kent TN4 0PB. Tel: 0892 27454. YC

Tech draw 64

A comprehensive technical illustration aid for C64 owners for both disk and tape.

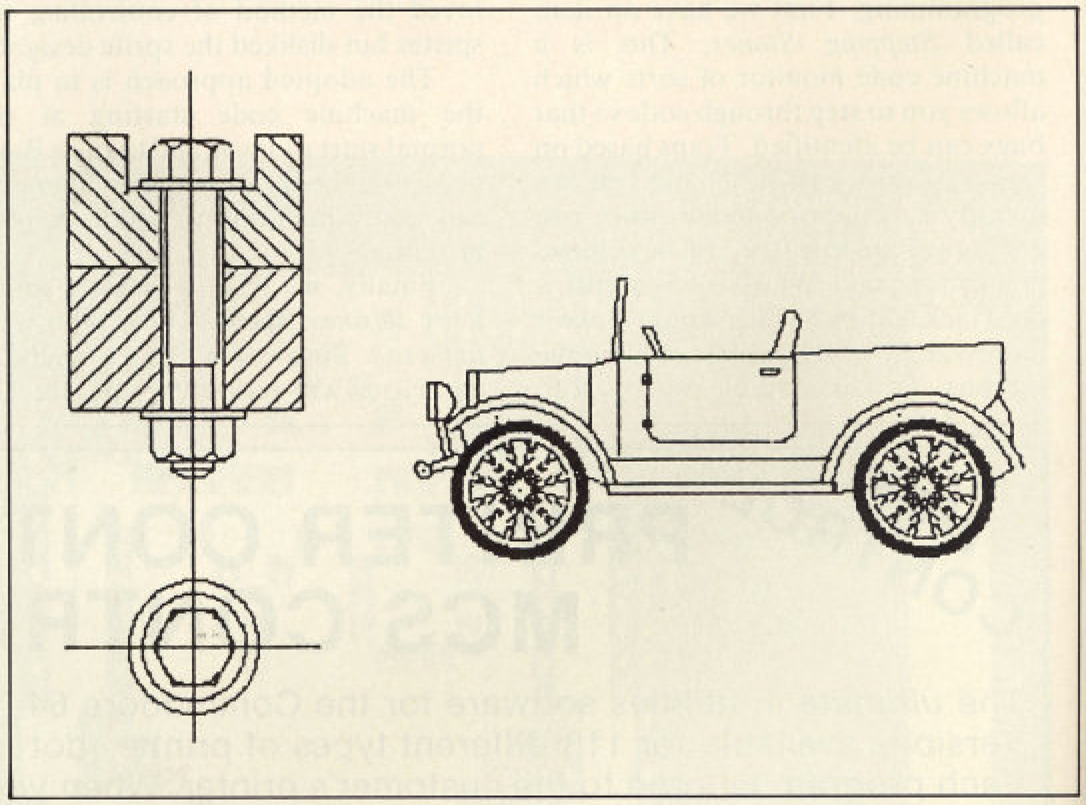
As you should know, *Your Commodore* is always on the look out for high quality programs to publish in the magazine. However, some programs that we think are excellent may never appear in print due to their enormous length. With **Tech Draw 64** we are pleased to announce the birth of *Your Commodore* Software. This is an extension of our Software Service which will make high-quality programs available to our readers at a reasonable price. And **Tech Draw 64** is the very first program to be offered through this service.

Tech draw 64 is a comprehensive technical illustration aid, utilising the high-resolution mode of the C64. The program is either disk or cassette based and permits output to a selection of Commodore printers.

The program's ability to measure line lengths and angles allows geometric shapes to be drawn quickly and accurately. This together with precise copy and rotation features permits complex details to be constructed easily.

Once a drawing is completed it may be saved to disk or tape (depending on the version of the program) for future recovery and update.

For users requiring colour, there are a number of options existing. Photography of colourful drawings is therefore possible.



In Use

The main menu of **Tech Draw 64** offers the following options:

create drawing;
return to drawing;
save drawing;
load drawing;
print drawing;
help (list functions).

The **create drawing** option takes the user of the program to the drawing screen. The main cursor appears in the centre of the screen and is accompanied by two edge cursors which move along the horizontal and vertical axes.

These axes are graduated at intervals of eight pixels, so dividing the hi-res screen into a grid corresponding to the normal text screen. The axes and edge cursors can be used to position a drawing or to position drawings for colouring.

At the top of the screen is the prompt line; this is where you will be prompted for inputs, etc, by the program. The right hand edge of the prompt line contains a *vector box*. This is used to give the user information on the length and angle of parts of the drawing in process.

Moving around

A joystick is used to move the cursor around the screen. Two speeds of movement are provided. *Fast* mode allows you to move around the screen quickly, while *slow* mode allows you to position the cursor with accuracy.

Plotting a point

All operations within the program are based around points. For example to draw a line, two points are plotted and the line command is used to join them together. Plotting a point requires only a single keypress; you will soon get the

hang of defining points for each of the commands. Some commands, eg plotting an arc, require more than two points to be plotted on the screen.

Since the point plotted is quite small, just a single pixel, you may quite rightly think that positioning the cursor on a specific point is quite difficult. This is where the auto-cursor comes into play: This allows you to define up to nine different points on the screen and then jump the cursor around them by simply pressing the relevant key 1 to 9.

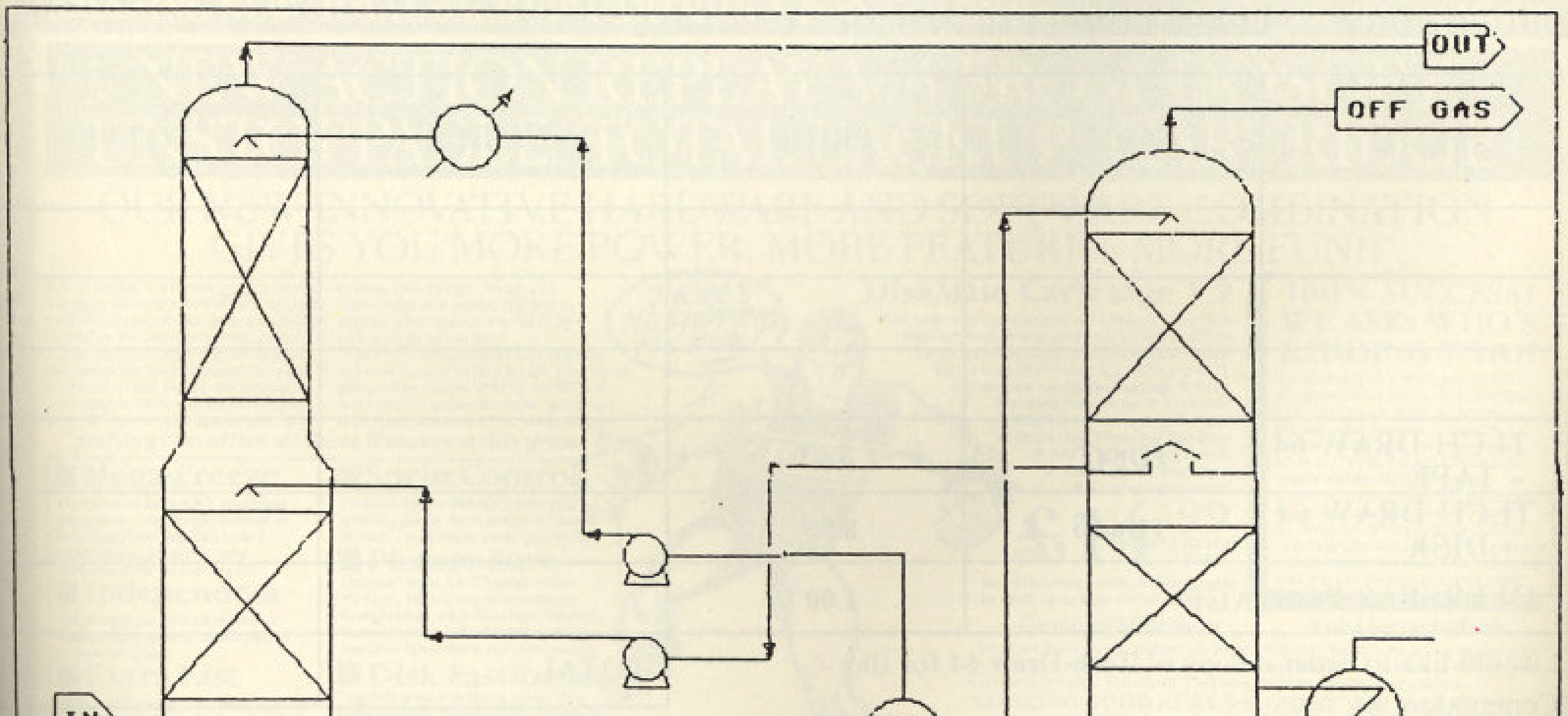
Functions available

Line draw – this requires two points to be plotted, the two ends of the line. Actitivating the line command gives you the option of drawing or erasing the line or, in case you make a mistake, abandoning the operation;
Rays – the **Line** command draws a line between two specified points. Rays is similar but draws several lines from the same original points;
Box – rectangles are a common feature in any technical drawing. **Box** allows such shapes to be drawn without having to resort to drawing each line individually. A box is drawn from two points which are to make up opposite the corners of the box; the command causes the box to be drawn with horizontal and vertical sides so as to join the two points;
Circle – two points are required in order to draw a circle. One point should be the centre of the circle and the other is any point on the circumference;
Arc – uses three points to produce an arc rather than a complete circle. Two versions of this command exists: either you specify the radius of the circle and the two ends of the arc; or you specify the ends of the arc and one point in between;
Ellipse – as you would expect, this draws an oval shape on the screen. Two points are required for the generation of an ellipse. One is the highest point on the ellipse the second the 3 O'clock position (the ellipse is always drawn with its axis horizontal or vertical);
Freehand – allows you to draw on the screen freehand style . You can either draw or erase in freehand mode;
Fill – as its name suggests fills a closed figure with the current ink colour;
Hatch – in technical drawing a series of parallel diagonal lines are used to show a shaded area. The hatch option allows you to alter the width between the lines in a hatch operation;
Text – allows you to label and caption any illustrations that you may produce.

Block functions

A block function is one which allows you to carry out specific operations on a rectangular area of the screen. The block is designed, as for a rectangle, by plotting two points; you then select the operation you want.

The following operations are available:
Wipe – this is used to clear the defined block from the drawing;
Copy – this allows you to place a copy of the specified block elsewhere on the screen. Uses might include duplicating shapes, such as electronic symbols, at



This simple flowsheet is a composite of four screen drawings. The screen axes and edge cursors are used to record the positions of the linking lines from one section to another.

different areas on the screen. You can place the originals for regularly used symbols around the sides of the screen leaving the centre free;
Move – this is similar to **Copy**, with the difference that this operation moves the specified area to a new point on the screen, deleting the old area;
Rotate – this function permits a block to be rotated through any angle about a defined centre of rotation.

Colouring it in

Even though **Tech Draw 64** is mainly designed with technical drawing in mind, some users will want to use colour in their designs.

Tech Draw 64 allows you to specify the colour of the ink that you are using and the background colour. Local colour allows you to alter the background colour under the cursor to the one specified. Only two colours, foreground and background, per character square are allowed because of the limitations of the C64's hardware in hi-resolution mode.

The ink colour of any rectangular block on the screen can be changed with the re-ink block function.

Once you're done

As previously mentioned, provision exists to SAVE your finished masterpiece onto either tape or disk, depending on the version of the program that you are using. The printer option allows you to reproduce your drawing on either a Commodore 1526 printer, or an MPS 801/803, or compatible.

In the case of 801/803 you will have the choice of either large or small print-out.

The 1526 printer option produces small but accurate copies of your drawing. It is rather slow, since it has to re-define the character to be printed as the drawing is reproduced.

What to do

Tech Draw 64 is an extremely powerful drawing package, especially suited to users who need to produce acurate drawings and technical illustrations. The program is available only from *Your Commodore* and comes complete with a manual explaining each command in much more detail than we can go into here.

The cost of the program is £8.95 for both disk and tape versions, and this price includes package and postage. Orders for the program should be on the form at the foot of this article, and should be accompanied by a cheque or postal order for £8.95 made payable to Argus Specialist Publications. Overseas readers should add a further £1.00 Sterling to cover the extra postage.

Orders should be sent to the Readers Services address on the form NOT to the *Your Commodore* editorial address.

More to come

As mentioned before **Tech Draw 64** is the first of a series of high-quality programs that we will be making available to the public, but which are too large and would rquired too much documentation to publish in the magazine as a listing. Watch this space for future offers!

ORDER FORM – PLEASE COMPLETE IN BLOCK CAPITALS

NAME	CODE	PRICE	NUMBER	TOTAL
TECH DRAW 64 – TAPE	TD64T	8.95		
TECH DRAW 64 – DISK	TD64D	8.95		
OVERSEAS POSTAGE		1.00		
			TOTAL	

I would like to order a copy of **Tech Draw 64** for the Commodore 64.

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All orders should be sent to: YOUR COMMODORE, READERS SERVICES, ARGUS SPECIALIST PUBLICATIONS, 9 HALL ROAD, HEMEL HEMPSTEAD, HERTS HP2 7BH.
Please allow 28 days for delivery.

Programmable Function Keys

Have you ever wished that you could make more use of the function keys on your C64? This utility could be what you've been waiting for.

By D.J. Baker

The function keys on the C64 are extremely useful for selecting options within a program and are easy to detect. However, on many computers it is possible to store strings of characters in memory so that when the key is pressed a specified operation is carried out. Even though the C64 has function keys, for some silly reason Commodore didn't provide a simple way for you to use them in this fashion.

This program will allow you to store up to 30 characters, commands etc. in memory so that C64 owners can now have access to true programmable keys. In use function keys are an invaluable and time saving tool. You could for example define a key so that a press of it will LIST your program, or even LOAD a program off of disk or tape. In fact the possibilities are endless.

Getting It In

The program is presented in the form of a Basic loader and should present you with no difficulties when entering. Do make sure that you have read the LISTINGS page and are using the Syntax Checker to aid your typing. When the program has been entered make sure that you SAVE it before you RUN it. Once the program has been RUN type NEW and then SYS 52224 to start the Function Key program.

In Use

The keys F1 to F6 can all be defined as function keys. You can store a string of up to 30 characters in each key. When you press the key the characters will be reproduced as if you had them on the keyboard.

```
PROGRAM: FUNKEY LOADER

A1  100 REM ********************
A1  110 REM *                  *
0E  120 REM * MACRO KEY UTILITY *
0D  130 REM *                  *
E9  140 REM ********************
AC  150 :
9A  160 :
9F  170 COUNT = 0:PRINT CHR$(147);"[SPC8]PLEASE
    WAIT-ENTERING DATA..."
34  180 REM 8 SPACES
18  190 FOR X = 52224 TO 52651: READ A : POKE X
    , A : COUNT = COUNT + A
90  200 PRINT CHR$ (19);X : NEXT X
4B  210 PRINT
A6  220 IF COUNT <> 54163 THEN PRINT "DATA ERROR
     ! COUNT =";COUNT : STOP
85  230 PRINT "DATA CORRECT - SAVE,THEN SYS 5222
    4 TO","WEDGE ROUTINE INTO IRQ."
60  240 STOP
C0  250 :
11  260 DATA  76, 32,204, 80, 82, 69, 83, 83, 32
    , 75, 69, 89, 32, 84
80  270 DATA  79, 32, 64, 67, 76, 69, 65, 82, 64
    , 68, 69, 70, 73, 78
DF  280 DATA  69, 64,  1,  1,120,169, 56,141, 20
    ,  3,169,204,141, 21
92  290 DATA   3,169,  0,168,153,  0,206,200,192
    ,  0,208,248, 88, 96
E0  300 DATA  32,159,255,166,198,240, 25,202,189
    ,119,  2,201,133,144
E6  310 DATA  17,201,141,176, 13,198,198,201,136
    ,240, 37,201,140,240
DC  320 DATA   6, 76,234,204, 76, 49,234,160,  0
    , 32, 93,205,160, 14
EF  330 DATA  32, 93,205, 32,108,205,168,169,  0
    ,153,  0,206,169, 13
00  340 DATA  32,210,255, 76, 88,204,160,  0, 32
    , 93,205,160, 20, 32
04  350 DATA  93,205,169, 13, 32,210,255, 32,108
    ,205,141,189,204,141
A2  360 DATA 224,204,169,206,141,190,204,141,225
    ,204,169,  0,141, 30
31  370 DATA 204,160,  1,152, 72, 32,146,205,170
    ,104,168,138,201, 95
21  380 DATA 240, 52,201,160,208, 14,192,  2,176
    ,  3, 76,157,204,136
23  390 DATA 136,169, 20, 76,205,204,153,  0,206
    ,201, 32,144,  8,201
```

F7 is used to call the key define routine and F8 is used to clear a definition. When you press F7 or F8 you will be prompted for the key that you wish to define or clear. When the relevant key is pressed an asterix '*' is displayed to show that the press has been registered. You should now type in the text that you wish to be stored in the key. Use the left arrow key to end a definition and the combination of shift and space to delete characters.

Any key presses that would produce a reverse graphic in a print statement, CLR, HOME etc. will have their symbol displayed as a left arrow in the definition. Keys may be re-defined at any time by repeating the definition procedure. Any keys that have not been defined or have been cleared will be ignored whenever they are pressed.

For those interested, the program starts at memory location $CC00 (52224) and a buffer at $CE00 upwards holds your definitions. The IRQ vector at $0314/5 is altered to point to this routine. YC

```
9A  400 DATA 160,176,  6,201,128,144,  2,169, 95
    , 32,210,255,200,192
94  410 DATA  32,208,200,169, 20, 32,210,255,136
    , 76,157,204,136,140
14  420 DATA   0,206,169, 13, 32,210,255, 76, 88
    ,204, 56,233,133,168
22  430 DATA 169,  0,192,  0,240,  7,136, 24,105
    , 31, 76,240,204,141
31  440 DATA   7,205,141, 78,205,141, 27,205,160
    ,  0,185,  0,206,170
4B  450 DATA 134,198,240, 76,162,  0,142, 30,204
    ,201, 11,144, 42, 72
A7  460 DATA 162,  1,189,  0,206, 32,210,255,232
    ,224, 11,208,245,173
39  470 DATA  30,204, 24,105, 10,141, 30,204,173
    , 27,205, 24,105, 10
6A  480 DATA 141, 27,205,172, 30,204,104, 56,233
    , 10, 76, 19,205,170
43  490 DATA 200,134,198,142, 31,204,238, 31,204
    ,162,  0,185,  0,206
76  500 DATA 157,119,  2,232,200,236, 31,204,208
    ,243, 76, 88,204,185
DC  510 DATA   3,204,201, 64,240,  7, 32,210,255
    ,200, 76, 93,205, 96
76  520 DATA  32,146,205,201,133,144,249,201,140
    ,176,245,201,136,240
D6  530 DATA 241, 56,233,133,170,169, 42, 32,210
    ,255,169,  0,224,  0
D9  540 DATA 240,  7, 24,105, 31,202, 76,134,205
    , 96,173,138,  2, 72
2B  550 DATA 169, 64,141,138,  2, 32,159,255, 32
    ,228,255,201,  0,240
44  560 DATA 241,170,104,141,138,  2,138, 96
```

CALC 64

For those annoying little sums that you can't do in y our head, CALC 64 will speedily come to your aid.

By T. Lansbury

Unless you own one of those nifty computer calculators, it can be annoying and troublesome to break off writing a program to check the result of a calculation. If you are using Basic, then a direct mode statement can often give you the answer. When the calculation is lengthier, then a short stand-alone routine can sometimes suffice.

If you are writing machine code, then additions, subtractions and logical operations should have been confirmed before the code is entered at the keyboard. The use of a monitor such as the excellent ZOOM is to be recommended. Logical operations can be checked by a short routine, written in a spare part of memory, ending in a BRK instruction.

But you cannot beat the convenience of a fast calculator for such work.

The Program

CALC will give you this facility, at the touch of a key. It is a handy, instant result calculator that performs operations on real (floating point) numbers and will also handle computer arithmetic. Additions, subtractions, shifts, rotates, logical operations, can all be done by pressing the relevant command key.

When installed, the F1 key calls up CALC, where the last result can be seen and noted, or printed on the screen for use in your program.

CALC has two menus. Each menu is a four-line "duck-shoot" menu at the top of the screen. The information that originally occupied those four lines is saved to memory and restored upon exit. The top two lines of each menu contain the commands and the third line displays the calculator total so far. Line four is the guidance line and is a fuller description of the current command.

In Use

When CALC is first entered, the first menu is displayed with the command ZERO highlighted. Use of the cursor keys will take the highlighting to further commands. The cursor keys can be used in either direction, and there is full wrap-round to both ends of each menu. Pressing RETURN then executes the selected command.

When the commands are familiar, there is a quicker way to use CALC – just press the initial letter of the required command, and that command will be executed immediately without having to press RETURN.

Commands

When CALC is first entered the following commands are available:

ZERO: Sets the floating point total to zero.
PLACES: Sets the number of decimal places displayed (range: 1-8).
ADD: Add number to total.
SUBR.: Subtract number from total.
MULTIPLY: Multiply total by number.
DIVIDE: Divide total by number.
RESULT: Prints result to the screen and exits CALC. The result is printed at the cursor position when CALC was entered, and the cursor is repositioned on the line below the result.
INTEGER: As with Basic's INT function – removes the fractional part of the total.
FRACTION: The opposite of INT – removes the figures before the decimal point, leaving the decimal fraction only.
6510ARITH: Access to second menu.
QUIT: Quits CALC and returns to Basic. The F3 key can also be used to quit CALC: This enables the user to snatch a quick look at the results so far, and then exit by pressing the next nearest function key.

Entry to the second menu presents the following commands:

ZERO: Zero accumulator.
NEW: Enter number into accumulator.
PLUS: Add with Carry.
MINUS: Subtract with Carry.
INCRT: Increment accumulator.
DECRT: Decrement accumulator.
TOTAL: Print conversion line on screen and exit CALC.
0-C: Clear the Carry flag.
1-C: Set the Carry flag.
AND: Perform logical AND.
ORA: Perform Inclusive OR.
EOR: Perform Exclusive OR.
SHIFT: Shift left or right.
ROTATE: Rotate left or right.
FIRST: Exit to first menu.

Entering the Program

CALC sits in the $C000-$CFFF (49152-53247) block of memory. Type in the program exactly as shown, save and then run it. The program will poke the data statements into memory, checking for typing errors and illegal quantities as it goes. The line number will be printed in the event of an error. If all is well, insert a disk into the drive and press RETURN. CALC will then be written to disk and can be loaded for future use by LOAD"CALC",8,1. When CALC has loaded, type NEW RETURN, followed by SYS49152. CALC is then ready for use.

If you do not have a disk drive, change line 1170 to read: SAVE"CALC",1,1.

PROGRAM: CALC LOADER

```
30 1000 REM ******************************
9F 1002 REM * THIS PROGRAM POKES THE *
39 1004 REM * MACHINE CODE FOR THE CALC *
02 1006 REM * PROGRAM INTO MEMORY & THEN *
7B 1008 REM * SAVES IT OUT AS A MACHINE *
59 1010 REM * CODE FILE. *
04 1012 REM ******************************
D5 1030 SA=49152
3B 1040 PRINTCHR$(147)"READING DATA"
E0 1050 PRINT"PLEASE WAIT..."
8C 1060 PRINTCHR$(19)CHR$(17)CHR$(17)CHR$(17)CHR$(17);SA
2B 1070 LT=0:FORJ=0TO15
4C 1080 READA:IFA=-1THENGOTO1140
6E 1090 IFA>255THENGOTO1190
E1 1100 LT=LT+A:POKESA+J,A:NEXTJ
31 1110 READT
E6 1120 IFT<>LTTHENGOTO1190
59 1130 SA=SA+16:GOTO1060
D1 1140 PRINTCHR$(147)"PRESS ANY KEY TO SAVE"
6A 1150 GETX$:IFX$=""THEN1150
E9 1160 POKE43,0:POKE44,192:POKE45,192:POKE46,207:CLR
BE 1170 SAVE"CALC",8,1:END
28 1180 REM CHANGE ,8,1 TO ,1,1 FOR TAPE
18 1190 PRINT"ERROR IN LINE"SA:STOP
D6 49152 DATA120,173,20,3,141,31,207,173,21,3,141,32,207,169,49,141,1631
5B 49168 DATA20,3,169,192,141,21,3,169,0,141,33,207,88,169,11,141,1508
5B 49184 DATA33,208,169,237,160,200,32,30,171,169,152,160,201,32,30,171,2155
4E 49200 DATA96,165,197,201,4,208,12,173,141,2,201,1,240,5,173,33.1852
A2 49216 DATA207,240,3,108,31,207,56,32,240,255,142,103,207,140,102,207,2280
C4 49232 DATA32,108,229,165,209,141,104,207,165,210,141,105,207,169,0,141,2333
25 49248 DATA4,207,169,255,141,33,207,165,206,141,180,207,165,211,141,181,2613
7F 49264 DATA207,169,1,133,204,133,207,173,32,208,141,99,207,173,33,208,2328
FB 49280 DATA141,98,207,169,252,141,32,208,169,251,141,33,208,173,134,2,2359
D0 49296 DATA141,100,207,169,1,141,134,2,32,211,194,173,24,208,141,101,1979
B0 49312 DATA207,169,23,141,24,208,169,1,141,182,207,120,173,0,3,141,1909
54 49328 DATA187,207,173,1,3,141,188,207,169,140,141,0,3,169,200,141,2070
62 49344 DATA1,3,169,193,141,24,3,88,162,3,32,61,195,32,74,195,1376
BC 49360 DATA169;0,141,106,207,32,108,195,32,198,194,32,131,195,173,182,2095
E7 49376 DATA207,201,1,208,9,32,47,195,32,22,199,76,244,192,32,47,1744
D0 49392 DATA195,32,24,200,169,0,133,251,169,4,133,252,173,4,207,170,2116
84 49408 DATA189,154,207,133,251,160,0,177,251,201,32,240,9,73,128,145,2350
2F 49424 DATA251,200,192,10,208,241,32,207,193,32,228,255,240,251,32,214,2786
F8 49440 DATA200,201,134,208,3,76,12,194,201,29,240,60,201,157,240,102,2258
31 49456 DATA72,173,182,207,201,1,208,16,162,0,104,221,5,207,240,31,2030
3B 49472 DATA232,224,11,208,246,76,85,193,162,11,104,221,5,207,240,15,2240
C3 49488 DATA232,224,26,208,246,201,13,208,3,76,247,193,76,25,193,142,2313
A5 49504 DATA4,207,32,207,193,76,247,193,32,108,195,238,4,207,173,182,2298
30 49520 DATA207,201,1,208,18,173,4,207,201,11,208,8,169,0,141,4,1761
FB 49536 DATA207,76,244,192,76,252,192,173,4,207,201,26,208,246,169,11,2484
61 49552 DATA141,4,207,76,244,192,32,108,195,206,4,207,173,182,207,201,2379
FC 49568 DATA1,208,22,173,4,207,201,0,48,3,76,244,192,169,10,141,1699
A2 49584 DATA4,207,169,0,133,251,76,252,192,173,4,207,201,10,240,3,2122
37 49600 DATA76,244,192,169,25,141,4,207,169,0,133,251,76,252,192,24,2155
EF 49616 DATA162,3,160,0,32,240,255,169,155,32,210,255,173,4,207,10,2067
38 49632 DATA170,189,105,203,232,188,105,203,32,30,171,162,0,169,32,169,2160
D1 49648 DATA246,160,206,32,30,171,96,173,4,207,10,170,189,53,203,141,2091
AB 49664 DATA183,207,232,189,53,203,141,184,207,108,183,207,32,18,194,76,2417
F5 49680 DATA49,234,162,3,32,61,195,162,0,189,149,207,149,251,232,224,2299
BC 49696 DATA5,208,246,173,100,207,141,134,2,173,99,207,141,32,208,173,2249
06 49712 DATA98,207,141,33,208,173,101,207,141,24,208,169,54,133,1,160,2058
F7 49728 DATA0,185,0,160,153,0,4,185,0,161,153,0,216,200,192,160,1769
CE 49744 DATA208,239,173,208,162,141,135,2,162,0,189,209,162,149,209,232,2580
D6 49760 DATA224,36,208,246,169,55,133,1,120,173,187,207,141,0,3,173,2076
D3 49776 DATA188,207,141,1,3,169,71,141,24,3,88,169,0,141,33,207,1586
0F 49792 DATA141,106,207,173,100,207,141,134,2,32,203,200,173,4,207,201,2231
0F 49808 DATA6,240,10,201,17,240,6,169,0,133,204,133,207,96,162,1,1825
00 49824 DATA32,61,195,169,195,160,206,32,30,171,32,228,255,240,251,201,2458
88 49840 DATA76,240,7,201,82,240,9,76,170,194,169,1,141,148,207,96,2057
3C 49856 DATA169,2,141,148,207,96,162,0,169,0,157,0,1,232,224,10,1718
AE 49872 DATA208,248,96,169,0,133,251,169,4,133,252,169,0,133,253,169,2387
CE 49888 DATA216,133,254,169,54,133,1,169,0,133,38,169,160,133,39,169,1970
43 49904 DATA0,133,40,169,161,133,41,169,0,141,4,207,160,0,185,0,1543
0B 49920 DATA4,153,0,160,185,0,216,153,0,161,200,192,160,208,239,162,2193
EA 49936 DATA0,181,209,157,209,162,232,224,37,208,246,173,135,2,141,208,2524
AC 49952 DATA162,169,55,133,1,96,24,162,0,160,0,32,240,255,96,24,1609
9B 49968 DATA162,2,160,0,32,240,255,169,18,32,210,255,96,32,255,233,2151
9C 49984 DATA202,240,3,76,61,195,32,255,233,96,162,0,181,251,157,149,2293
4D 50000 DATA207,232,224,5,208,246,162,0,169,0,149,251,232,224,5,208,2522
21 50016 DATA249,173,104.207,133,253,173,105,207,133,254,96,173,182,207,201,2850
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23  50032 DATA1,208,8,169,143,16
    0,202,32,30,171,96,169,226,1
    60,202,32,2009
6F  50048 DATA30,171,96,169,139,
    160,195,32,30,171,96,19,17,1
    7,5,18,1365
66  50064 DATA32,32,32,32,32,32,
    32,32,32,32,32,32,32,32,32,3
    2,512
56  50080 DATA32,32,32,32,32,32,
    32,32,32,32,32,32,32,32,32,3
    2,512
AD  50096 DATA32,32,32,32,32,32,
    32,32,146,0,169,194,160,195,
    32,30,1182
90  50112 DATA171,96,19,146,32,1
    97,78,84,69,82,32,78,85,77,6
    6,69,1381
D1  50128 DATA82,32,0,162,132,16
    0,207,32,212,187,32,198,194,
    76,208,192,2106
AD  50144 DATA169,112,160,207,32
    ,162,187,96,169,132,160,207,
    32,162,187,96,2270
F7  50160 DATA162,0,169,0,157,13
    2,207,157,0,1,232,224,13,208
    ,245,76,1983
D6  50176 DATA208,192,32,135,198
    ,173,143,207,201,8,240,9,144
    ,3,76,2,1971
51  50192 DATA196,201,0,240,237,
    141,107,207,238,107,207,76,2
    08,192,32,211,2600
0E  50208 DATA197,169,132,160,20
    7,32,162,187,169,112,160,207
    ,32,103,184,76,2289
2D  50224 DATA211,195,32,211,197
    ,173,112,207,208,3,76,208,19
    2,32,224,195,2476
A9  50240 DATA169,132,160,207;32
    ,80,184,76,211,195,32,211,19
    7,173,147,207,2413
33  50256 DATA208,3,76,208,192,3
    2,224,195,169,132,160,207,32
    ,40,186,76,2140
5D  50272 DATA211,195,32,211,197
    ,173,112,207,208,3,76,208,19
    2,32,224,195,2476
47  50288 DATA169,132,160,207,32
    ,15,187,76,211,195,32,203,20
    0,169,146,32,2166
A5  50304 DATA210,255,32,18,194,
    162,0,189,34,207,240,7,32,21
    0,255,232,2277
1C  50320 DATA76,135,196,173,103
    ,207,201,24,208,6,32,234,232
    ,76,163,196,2262
CC  50336 DATA238,103,207,169,0,
    141,102,207,32,203,200,169,0
    ,133,204,133,2241
3D  50352 DATA207,76,49,234,32,2
    32,195,32,204,188,76,211,195
    ,162,0,189,2282
E9  50368 DATA132,207,157,112,20
    7,232,224,5,208,245,32,224,1
    95,32,204,188,2604
95  50384 DATA169,132,160,207,32
    ,80,184,162,0,169,0,157,132,
    207,157,112,2060
91  50400 DATA207,232,224,5,208,
    245,76,211,195,238,182,207,1
    69,11,141,4,2555
FB  50416 DATA207,76,208,192,76,
    12,194,169,0,76,116,197,32,1
    35,198,173,2061
BE  50432 DATA143,207,76,116,197
    ,32,135,198,24,173,144,207,1
    06,173,142,207,2280
A6  50448 DATA109,143,207,76,116
    ,197,32,135,198,24,173,144,2
    07,106,173,142,2182
A7  50464 DATA207,237,143,207,76
    ,116,197,238,142,207,76,208,
    192,206,142,207,2801
36  50480 DATA76,208,192,32,203,
    200,32,18,194,162,0,189,58,2
    07,32,210,2013
FA  50496 DATA255,232,224,38,208
    ,245,76,147,196,169,0,76,192
    ,197,169,1,2425
E5  50512 DATA76,192,197,32,135,
    198,173,142,207,45,143,207,7
    6,116,197,32,2168
26  50528 DATA135,198,173,142,20
    7,13,143,207,76,116,197,32,1
    35,198,173,142,2287
25  50544 DATA207,77,143,207,141
    ,142,207,76,208,192,32,158,1
    94,173,148,207,2512
41  50560 DATA201,2,240,10,173,1
    42,207,10,141,142,207,76,189
    ,197,173,142,2252
EA  50576 DATA207,74,141,142,207
    ,76,189,197,32,158,194,173,1
    48,207,201,2,2348
40  50592 DATA240,15,24,173,144,
    207,106,173,142,207,42,141,1
    42,207,76,189,2228
AC  50608 DATA197,24,173,144,207
    ,106,173,142,207,106,141,142
    ,207,169,0,42,2180
6D  50624 DATA141,144,207,76,208
    ,192,169,0,141,4,207,169,1,1
    41,182,207,2189
D4  50640 DATA76,208,192,162,0,1
    38,157,112,207,232,224,5,208
    ,248,162,0,2331
F8  50656 DATA138,157,34,207,232
    ,224,24,208,248,141,147,207,
    162,1,32,61,2223
00  50672 DATA195,32,186,195,160
    ,0,140,110,207,140,111,207,1
    69,164,32,210,2258
72  50688 DATA255,169,157,32,210
    ,255,32,228,255,240,251,201,
    20,208,16,32,2561
6F  50704 DATA210,255,206,111,20
    7,173,111,207,48,185,240,183
    ,76,252,197,201,2862
65  50720 DATA13,208,10,168,173,
    111,207,240,170,152,76,92,19
    8,201,46,208,2273
D4  50736 DATA16,174,110,207,240
    ,3,76,6,198,162,1,142,110,20
    7,76,73,1801
85  50752 DATA198,201,47,144,193
    ,201,58,176,189,172,111,207,
    153,34,207,32,2323
09  50768 DATA210,255,238,111,20
    7,172,111,207,192,20,208,160
    ,172,111,207,240,2821
F1  50784 DATA37,169,1,141,147,2
    07,169,0,153,34,207,200,153,
    34,207,169,2028
EF  50800 DATA32,32,210,255,169,
    34,133,122,169,207,133,123,3
    2,138,173,162,2124
F4  50816 DATA112,160,207,32,212
    ,187,96,162,0,138,157,34,207
    ,232,224,24,2184
E8  50832 DATA208,248,169,0,141,
    143,207,162,1,32,61,195,32,1
    86,195,160,2140
1E  50848 DATA0,140,111,207,169,
    164,32,210,255,169,157,32,21
    0,255,32,228,2371
82  50864 DATA255,240,251,201,20
    ,208,16,32,210,255,206,111,2
    07,173,111,207,2703
62  50880 DATA48,197,240,195,76,
    164,198,201,13,208,10,168,17
    3,111,207,240,2449
33  50896 DATA182,152,76,240,198
    ,201,47,144,213,201,58,176,2
    09,172,111,207,2587
CC  50912 DATA153,34,207,32,210,
    255,238,111,207,172,111,207,
    192,4,208,180,2521
AC  50928 DATA172,111,207,169,0,
    153,34,207,169,32,32,210,255
    ,169,34,133,2087
B8  50944 DATA122,169,207,133,12
    3,32,138,173,32,247,183,201,
    0,240,3,76,2079
BD  50960 DATA135,198,140,143,20
    7,96,32,131,195,32,47,195,16
    9,18,32,210,1980
D1  50976 DATA255,32,53,199,162,
    0,189,34,207,240,9,73,128,15
    7,80,4,1822
72  50992 DATA232,76,38,199,96,1
    69,1,141,108,207,169,132,160
    ,207,32,162,2129
8D  51008 DATA187,36,102,16,5,16
    9,1,141,109,207,173,109,207,
    240,7,24,1733
00  51024 DATA165,102,105,128,13
    3,102,32,221,189,141,109,207
    ,162,0,160,0,1956
5A  51040 DATA185,0,1,201,69,240
    ,8,200,192,15,208,244,76,127
    ,199,162,2127
6E  51056 DATA0,189,0,1,157,34,2
    07,232,224,24,208,245,76,10,
    200,162,1969
B3  51072 DATA0,160,0,185,0,1,15
    3,34,207,185,1,1,201,48,240,
    27,1443
D6  51088 DATA201,46,240,69,153,
    35;207,200,185,1,1,201,0,240
    ,7,201,1987
3F  51104 DATA46,208,241,76,192,
    199,169,46,76,177,199,153,35
    ,207,200,169,2393
CA  51120 DATA46,153,35,207,169,
    48,200,232,236,107,207,208,2
    44,76,5,200,2373
E5  51136 DATA153,35,207,200,232
    ,236,107,207,208,3,76,5,200,
    185,1,1,2056
11  51152 DATA201,0,208,236,169,
    48,76,177,199,169,48,153,35,
    207,200,169,2295
F0  51168 DATA46,153,35,207,185,
    1,1,200,232,236,107,207,240,
    23,201,0,2074
D5  51184 DATA240,6,153,35,207,7
    6,228,199,236,107,207,240,8,
    169,48,153,2312
0B  51200 DATA35,207,76,228,199,
    169,0,153,35,207,162,0,189,1
    32,207,157,2156
11  51216 DATA122,207,232,224,5,
    208,245,96,169,0,172,142,207
    ,140,145,207,2521
88  51232 DATA32,145,179,32,221,
    189,162,0,189,1,1,240,7,157,
    60,207,1822
7E  51248 DATA232,76,40,200,169,
    32,157,60,207,232,157,60,207
    ,162,0,173,2164
2B  51264 DATA142,207,72,74,74,7
    4,74,32,127,200,232,104,41,1
    5,32,127,1627
EB  51280 DATA200,160,0,162,8,14
    ,145,207,176,3,169,48,44,169
    ,49,153,1707
2F  51296 DATA73,207,200,202,208
    ,239,173,144,207,24,105,48,1
    41,89,207,162,2429
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25  51312 DATA0,189,58,207,73,12
    8,157,80,4,232,224,40,208,24
    3,96,24,1963
81  51328 DATA105,246,144,2,105,
    6,105,53,157,67,207,96,138,4
    8,57,162,1703
74  51344 DATA0,169,0,157,112,20
    7,157,132,207,149,97,149,87,
    232,224,5,2084
9B  51360 DATA208,241,162,0,189,
    122,207,157,132,207,232,224,
    5,208,245,162,2701
EA  51376 DATA1,32,61,195,32,131
    ,195,169,223,160,206,32,30,1
    71,32,228,1898
6B  51392 DATA255,240,251,104,10
    4,104,104,184,76,208,192,24,
    174,103,207,172,2502
CE  51408 DATA102,207,32,240,255
    ,96,72,138,72,152,72,162,0,1
    60,0,200,1960
FB  51424 DATA208,253,232,224,32
    ,208,246,104,168,104,170,104
    ,96,147,5,18,2319
B8  51440 DATA32,32,32,32,32,32,
    32,32,32,32,32,213,195,201,3
    2,32,1025
B2  51456 DATA174,32,32,32,32,17
    4,32,32,32,32,32,32,32,32,32
    ,32,796
71  51472 DATA32,32,32,32,32,32,
    32,32,146,18,32,32,32,32,32,
    32,612
11  51488 DATA32,32,32,32,32,194
    ,32,32,213,201,194,213,201,1
    74,176,194,1984
7F  51504 DATA213,201,219,213,20
    1,176,201,32,32,32,32,32,32,
    32,32,32,1712
BD  51520 DATA32,32,146,18,32,32
    ,32,32,32,32,32,32,32,32,32,
    194,774
BB  51536 DATA32,32,213,179,194,
    194,32,194,194,194,213,179,1
    94,194,194,194,2626
45  51552 DATA32,32,32,32,32,32,
    32,32,32,32,32,32,146,18,32,
    32,612
F8  51568 DATA32,32,32,32,32,32,
    32,32,32,202,195,203,202,189
    ,177,202,1658
F7  51584 DATA203,202,203,177,20
    2,189,202,202,203,177,32,32,
    32,32,32,32,2152
08  51600 DATA32,32,32,32,32,32,
    146,0,17,32,32,70,49,32,70,7
    9,719
16  51616 DATA82,32,65,67,67,69,
    83,83,46,32,70,51,32,81,85,7
    3,1018
C6  51632 DATA84,83,32,67,65,76,
    67,85,76,65,84,79,82,46,32,3
    2,1055
3B  51648 DATA32,17,32,32,85,83,
    69,32,84,72,69,32,67,85,82,8
    3,956
5A  51664 DATA79,82,32,75,69,89,
    83,32,84,72,69,78,32,60,82,6
    9,1087
19  51680 DATA84,85,82,78,62,32,
    84,79,32,32,17,32,32,67,72,7
    9,949
36  51696 DATA79,83,69,32,67,79,
    77,77,65,78,68,44,32,79,82,3
    2,1043
2F  51712 DATA80,82,69,83,83,32,
    73,78,73,84,73,65,76,32,32,3
    2,1047
C1  51728 DATA32,32,32,17,32,32,
    76,69,84,84,69,82,32,79,70,3
    2,854
74  51744 DATA67,79,77,77,65,78,
    68,32,82,69,81,85,73,82,69,6
    8,1152
EF  51760 DATA46,32,32,65,70,84,
    69,82,32,32,32,32,17,32,32,8
    3,772
E0  51776 DATA84,79,80,47,82,69,
    83,84,79,82,69,44,32,83,89,8
    3,1169
59  51792 DATA32,52,57,49,53,50,
    32,82,69,65,67,84,73,86,65,8
    4,1000
8F  51808 DATA69,83,32,32,32,17,
    32,32,67,65,76,67,85,76,65,8
    4,914
63  51824 DATA79,82,46,32,32,32,
    32,32,32,32,32,32,32,32,32,3
    2,623
60  51840 DATA32,32,32,32,32,32,
    32,32,32,32,32,32,32,32,0,19
    ,467
C1  51856 DATA146,32,218,69,82,7
    9,32,208,76,65,67,69,83,32,1
    93,68,1519
0B  51872 DATA68,32,211,85,66,84
    ,82,46,32,205,85,76,84,73,80
    ,76,1385
43  51888 DATA89,32,196,73,86,73
    ,68,69,32,32,210,69,83,85,76
    ,84,1357
E3  51904 DATA32,201,78,84,69,71
    ,69,82,32,198,82,65,67,84,73
    ,79,1366
96  51920 DATA78,32,54,53,49,48,
    65,82,73,84,72,32,209,85,73,
    84,1173
AE  51936 DATA32,0,19,146,32,218
    ,69,82,79,32,206,69,87,32,20
    8,76,1387
EB  51952 DATA85,83,32,205,73,78
    ,85,83,32,201,78,67,82,84,32
    ,196,1496
F3  51968 DATA69,67,82,84,32,212
    ,79,84,65,76,32,32,32,48,45,
    195,1234
5B  51984 DATA32,49,45,195,32,19
    3,78,68,32,207,82,65,32,197,
    79,82,1468
77  52000 DATA32,211,72,73,70,84
    ,32,210,79,84,65,84,69,32,19
    8,73,1468
BA  52016 DATA82,83,84,32,0,240,
    195,2,196,30,196,50,196,74,1
    96,98,1754
E2  52032 DATA196,122,196,180,19
    6,189,196,233,196,244,196,24
    7,196,252,196,5,3040
85  52048 DATA197,22,197,39,197,
    45,197,51,197,73,197,78,197,
    83,197,95,2062
62  52064 DATA197,107,197,122,19
    7,152,197,198,197,157,203,18
    8,203,219,203,250,2987
3F  52080 DATA203,25,204,56,204,
    87,204,118,204,149,204,180,2
    04,211,204,242,2699
AA  52096 DATA204,17,205,48,205,
    79,205,110,205,141,205,172,2
    05,203,205,234,2643
26  52112 DATA205,9,206,40,206,7
    1,206,102,206,133,206,164,20
    6,18,32,211,2221
90  52128 DATA69,84,32,84,79,84,
    65,76,32,84,79,32,90,69,82,7
    9,1120
80  52144 DATA32,32,32,32,32,32,
    32,32,32,32,32,0,18,32,211,6
    9,682
8F  52160 DATA84,32,68,69,67,73,
    77,65,76,32,80,76,65,67,69,8
    3,1083
00  52176 DATA32,40,49,45,56,41,
    32,32,32,32,0,18,32,193,68,6
    8,770
09  52192 DATA32,84,79,32,84,79,
    84,65.76.32.32.32,32,32,32,3
    2,839
ED  52208 DATA32,32,32,32,32,32,
    32,32,32,0,18,32,211,85,66,8
    4,784
59  52224 DATA82,65,67,84,32,70,
    82,79,77,32,84,79,84,65,76,3
    2,1090
31  52240 DATA32,32,32,32,32,32,
    32,32,0,18,32,205,85,76,84,7
    3,829
FA  52256 DATA80,76,89,32,84,79,
    84,65,76,32,32,32,32,32,32,3
    2,889
0D  52272 DATA32,32,32,32,32,32,
    32,0,18,32,196,73,86,73,68,6
    9,839
CB  52288 DATA32,84,79,84,65,76,
    32,32,32,32,32,32,32,32,32,3
    2,740
C6  52304 DATA32,32,32,32,32,32,
    0,18,32,208,82,73,78,84,32,8
    2,881
9F  52320 DATA69,83,85,76,84,32,
    65,78,68,32,69,88,73,84,32,1
    95,1213
AC  52336 DATA193,204,195,32,32,
    0,18,32,212,82,85,78,67,65,8
    4,69,1448
6E  52352 DATA32,78,85,77,66,69,
    82,32,84,79,32,73,78,84,69,7
    1,1091
AE  52368 DATA69,82,32,32,0,18,3
    2,212,82,85,78,67,65,84,69,3
    2,1039
F2  52384 DATA78,85,77,66,69,82,
    32,84,79,32,70,82,65,67,84,7
    3,1125
12  52400 DATA79,78,32,0,18,32,5
    4,53,49,48,32,65,82,73,84,72
    ,851
81  52416 DATA77,69,84,73,67,32,
    32,32,32,32,32,32,32,32,32,3
    2,722
47  52432 DATA32,32,0,18,32,209,
    85,73,84,32,195,193,204,195,
    213,204,1801
56  52448 DATA193,212,207,210,32
    ,32,32,32,32,32,32,32,32,32,
    32,32,1206
95  52464 DATA32,0,18,32,218,69,
    82,79,32,210,69,71,73,83,84,
    69,1221
A0  52480 DATA82,32,32,32,32,32,
    32,32,32,32,32,32,32,32,32,3
    2,562
5A  52496 DATA0,18,32,197,78,84,
    69,82,32,78,85,77,66,69,82,3
    2,1081
2C  52512 DATA40,73,78,32,68,69,
    67,73,77,65,76,41,32,32,32,0
    ,855
64  52528 DATA18,32,193,68,68,32
    ,87,73,84,72,32,195,65,82,82
    ,89,1272
0B  52544 DATA32,32,32,32,32,32,
    32,32,32,32,32,32,32,32,0,18
    ,466
D3  52560 DATA32,211,85,66,84,82
    ,65,67,84,32,87,73,84,72,32,
    195,1351
04  52576 DATA65,82,82,89,32,32,
    32,32,32,32,32,32,32,0,18,32
    ,656
```

```
10   52592 DATA201,78,67,82,69,65
     ,83,69,32,210,69,71,73,83,84
     ,69,1405
CB   52608 DATA82,32,66,89,32,79,
     78,69,32,32,32,32,0,18,32,19
     6,901
00   52624 DATA69,67,82,69,65,83,
     69,32,210,69,71,73,83,84,69,
     82,1277
9C   52640 DATA32,66,89,32,79,78,
     69,32,32,32,32,0,18,32,208,8
     2,913
4F   52656 DATA73,78,84,32,82,69,
     83,85,76,84,32,65,78,68,32,6
     9,1090
80   52672 DATA88,73,84,32,195,19
     3,204,195,32,32,0,18,32,195,
     76,69,1518
1F   52688 DATA65,82,32,84,72,69,
     32,195,65,82,82,89,32,32,32,
     32,1077
69   52704 DATA32,32,32,32,32,32,
     32,32,32,0,18,32,211,69,84,3
     2,734
39   52720 DATA84,72,69,32,195,65
     ,82,82,89,32,32,32,32,32,32,
     32,994
D6   52736 DATA32,32,32,32,32,32,
     32,32,0,18,32,204,79,71,73,6
     7,800
4E   52752 DATA65,76,32,193,206,1
     96,32,32,32,32,32,32,32,32,3
     2,32,1088
EE   52768 DATA32,32,32,32,32,32,
     32,0,18,32,204,79,71,73,67,6
     5,833
BA   52784 DATA76,32,201,78,67,76
     ,85,83,73,86,69,32,207,210,3
     2,32,1439
BC   52800 DATA32,32,32,32,32,32,
     0,18,32,204,79,71,73,67,65,7
     6,877
A8   52816 DATA32,197,88,67,76,85
     ,83,73,86,69,32,207,210,32,3
     2,32,1401
BD   52832 DATA32,32,32,32,32,0,1
     8,32,211,72,73,70,84,32,76,6
     9,897
0E   52848 DATA70,84,47,82,73,71,
     72,84,32,32,32,32,32,32,32,3
     2,839
0E   52864 DATA32,32,32,32,0,18,3
     2,210,79,84,65,84,69,32,76,6
     9,946
EE   52880 DATA70,84,47,82,73,71,
     72,84,32,32,32,32,32,32,32,3
     2,839
C6   52896 DATA32,32,32,0,18,32,2
     10,69,84,85,82,78,32,84,79,3
     2,981
4A   52912 DATA205,69,78,85,32,20
     7,78,69,32,32,32,32,32,32,32
     ,32,1079
76   52928 DATA32,32,0,19,32,204,
     69,70,84,47,210,73,71,72,84,
     32,1131
AF   52944 DATA40,80,82,69,83,83,
     32,204,32,79,82,32,210,41,0,
     19,1168
BD   52960 DATA146,32,210,69,83,8
     5,76,84,32,79,85,84,32,79,70
     ,32,1278
29   52976 DATA82,65,78,71,69,0,3
     2,32,32,32,32,32,32,32,32,32
     ,685
64   52992 DATA32,146,5,0,0,90,80
     ,65,83,77,68,82,73,70,54,81,
     1006
12   53008 DATA90,78,80,77,73,68,
     84,48,49,65,79,69,83,82,70,0
     ,1095
9C   53024 DATA0,0,0,0,0,0,0,0,0,
     0,0,0,0,0,0,0,0
76   53040 DATA0,0,0,0,0,0,0,0,0,
     0,32,35,32,32,32,32,195
EB   53056 DATA32,32,36,32,32,32,
     32,32,37,32,32,32,32,32,32,3
     2,521
4F   53072 DATA32,32,32,67,65,82,
     82,89,61,32,32,32,32,32,32,3
     2,766
5A   53088 DATA32,32,0,0,0,0,0,0,
     0,0,0,5,0,0,0,0,69
EC   53104 DATA0,0,0,0,0,0,0,0,0,
     0,0,0,0,0,0,0,0
FC   53120 DATA0,0,0,0,0,0,0,0,0,
     0,0,0,0,0,0,0,0
F0   53136 DATA0,0,0,0,0,0,0,0,0,
     0,1,6,13,17,24,33,94
8D   53152 DATA41,48,56,65,75,1,6
     ,10,15,21,27,33,41,45,49,53,
     586
D7   53168 DATA57,61,67,74,0,0,0,
     0,0,0,0,0,0,255,0,0,514
08   53184 DATA-1
```

Software for sale

If you think that one of our programs looks very interesting, but you can't afford the time to type it in then our software service will help you out.

It's three o'clock in the morning. You sit at the computer keyboard just finished a marathon typing session entering one of the superb programs from *Your Commodore*. Your fingers reach for the keyboard and press the letters R, U and N. You press RETURN, sit back and nothing happens.

Everyone has probably faced this problem. When it does happen it's a matter of spending hours searching through the program for any typing mistakes. No matter how lo ng you look or how many people help you, you can usually guarantee that at least one little bug slips through unnoticed.

The *Your Commodore* Software Service makes available all of the programs from each issue on both cassette and disk at a price of £6.00 for disk and £4.00 for cassette. None of the documentation for the programs is supplied with the software since it is all available in the relevant magazine. Should you not have the magazine then back issues are available from the following address:

INFONET LTD, Times House, 179 The Marlowes, Hemel Hempstead, Herts. HP1 1BB.
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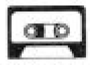
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The Disk

Programs on the disk will also be supplied as totally working versions, i.e. when possible we will not use Basic Loaders thus making use of the programs much easier. Unfortunately at the moment we cannot duplicate C16 and Plus/4 cassettes. However programs for these machines will be available on the disk.

What programs are available?

At the top of each article you will find a strap containing the article type, C64 Program etc. So that you can see which programs are available on which format you will also find a couple of symbols after this strap. The symbols have the following meaning:



This symbol means that the program is available on cassette.



These programs are available on disk.

Please Note

Since the programs supplied on cassette are total working versions of the program, we do not put disk only programs on tape. There is no sense in placing a program that expects to be reading from disk on to tape. YC

FEBRUARY 1987

TURBO MENU MAKER — Add menus and high speed loading to your disks (C64 — disk only).
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X-RAY FILE — Get more information from your disk drive (C64 disk).
ADVENTURE AID GRAPHICS — Easy graphics for our Adventure Creator system.
LABELLER 64 — Easy addressing with this label printer for the C64.
WORD PRO ADD ON — Add descenders to your MPS 801 printouts with the Plus/4 word processor.
NURSERY RHYME LAND — An educational adventure for the young ones.

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MARCH 1987

SPELLING CHECKER — for use with the Plus/4 word processor — disk only.
NINE LINE MATRIX — Clearer 80 column displays on your C128.
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DISKIT — Memory Saver, Program Compressor and One Part Maker. The first three parts of this popular series for C64 and disk (Disk only).
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APRIL 1987

CRIBBAGE – A computerised version of this popular card game. Plus/4, disk only.
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DISKIT 5 – A machine code to DATA statement convertor for C64. (Disk only).
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Cassettes or disks are available back to March 1986. Please ring the Editorial office (01-437-0626) for details of these.

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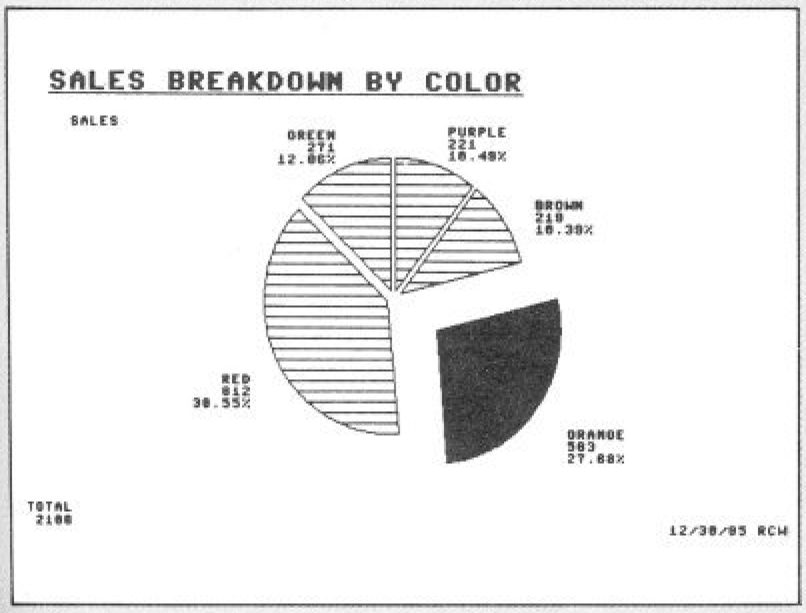
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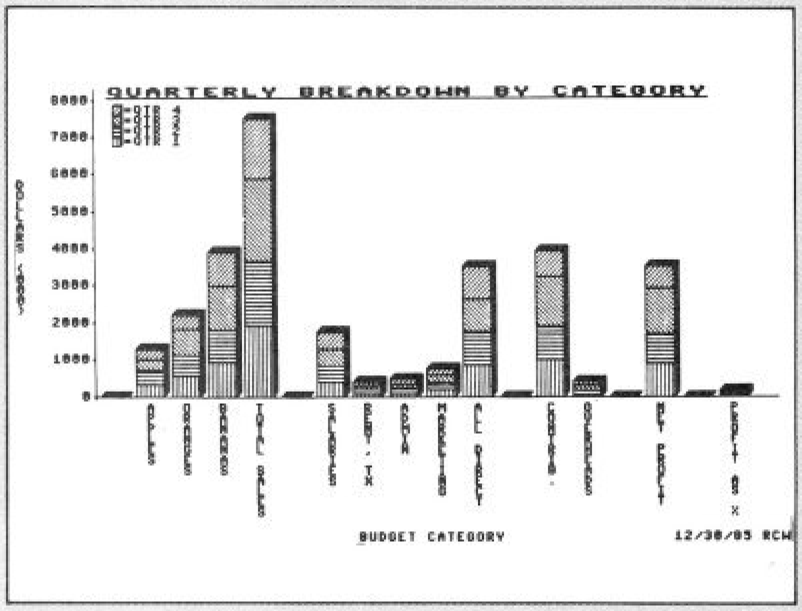
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Two from Adamsoft

Adamsoft has imported some impressive Abacus software from the US, in the past. Read on to see if the two latest offerings match up to the standards already set.

By Paul Eves





Most of the Abacus software that we've seen in the office in recent months has made a very good impression on us. Recently we've been sent two new packages.

The first is a C64/128 version of COBOL, probably one of the most useful programming languages invented. The second is a handy chart package which will enable you to see a graphic display of statistics or other useful information.

COBOL 128/COBOL 64

For those of you who like to have an easy life as far as programming is concerned, this package from Abacus Software is a must.

COBOL is the most widespread commercial programming language in use today. The reasons for its success are many.

So what is COBOL? The word COBOL is the abbreviated form of Common Business Orientated Language. It is business orientated for use in commercial programs. COBOL is a language that is common to many computers. Therefore, most computers equipped with a COBOL system can process any COBOL program, with only minor modifications.

The one single fact that makes this a great language to use, as far as I am concerned, is its English-like format. There is no complicated coding to be done. For example, to add two items together you simply say ADD. Another example is: MULTIPLY hours-worked BY hourly-wage GIVING gross-wage.

Obviously, the major advantages of such a language lie with the commercial users more than the home micro market. However, anybody who likes to do accounting programs or business software will surely find it advantageous.

Ingredients

Basically, COBOL programs are split into four distinct sections, these are:

IDENTIFICATION	division
ENVIRONMENT	division
DATA	division
PROCEDURE	division

The IDENTIFICATION division identifies the program. In addition to

required information, the programmer may include such optional extras as the date of the program, and the name of the programmer. This division is completely machine dependent.

The ENVIRONMENT division specifies the equipment being used, and some information about the files that will be used.

The DATA division contains file and record descriptions being manipulated or created and the individual logical records which comprise these files.

The PROCEDURE division is what we can call the 'Program'. This section contains the ENGLISH-LIKE statements that go into making up the program flow.

Structure

Once you have mastered this breaking down of the overall program into these four sections, you are half way there. Very briefly, I will demonstrate the structure of the above divisions. This structure must be adhered to in every COBOL program.

In Example 1 the following example, all entries in capitals are mandatory. Entries in square brackets are optional.

Example 1

```
IDENTIFICATION DIVISION.
PROGRAM-ID. PROG NAME
[author. Joe Bloggs]
[date-written. 22 April 87]
ENVIRONMENT DIVISION.
CONFIGURATION SECTION.
SOURCE-COMPUTER. C64.
OBJECT-COMPUTER. C64.
[input-output section]
[file-control]
    [select data 1 assign to disk-1541 drive 8]
DATA-DIVISION.
[file-selection]
[01 data-record]
    [02 name-field    pic x (15)]
    [02 address-field pic x (15)]
    [03 tele-no       pic x (10)]
[working-storage section]
[77 return-code value chr13 pic x]
PROCEDURE-DIVISION.
START.
(these are the actual program instructions)
END
```

There isn't enough room here to go into the ins and outs as to how each section is made up. Suffice to say, that once you have mastered this format, then you will have no trouble developing your COBOL programming skill.

Like all high level languages, COBOL is a structured language. At this point. I must admit that in general I do not like structure programming. Half the fun of programming to me is doing it as I go, however the accepted norm is that structuring is good for you.

I must also admit that I did have a little knowledge of COBOL before I tried this package from Abacus, consequently I was able to understand the manual with some ease. First time users would probably need to read the included manual two or even three times before it all sank in.

In general the manual is well laid out and informative. The software comprises of an Editor, Compiler, Interpreter and De-bugger.

The De-bugger is a very powerful tool which allows you to produce bug-free programs everytime. The De-bugging takes place on the source file, so there is no heavy machine language knowledge required on the part of the user. The Editor and De-bugger sections are all menu driven, and are thus easy to use.

I think that this is so far the best COBOL program for the C128/C64 that I have come across.

Chartpak

The second of the Abacus Software products, distributed by Adamsoft, is *Chartpak* 64/128. This is a very powerful package that enables you to create professional charts and graphs, without the headache of programing.

If you need to draw a quick pie, bar, line or scatter graph/chart from your own data, you can do so interactively. *Chartpak* instantly draws it on the screen for you. You can even take your data from *Multiplan* or *Calcresult*.

Chartpak also supports statistical analysis features, data reduction, exponential smoothing, least squares and a host of other things.

On the C128, the resolution is three times greater than on the C64. The package also supports a large range of different printer types.

Once again, the manual is both comprehensive and fairly straight-forward to follow. It takes you gently from the initial operation stage, hardware requirements and definitions used on to the actual tutorial.

The manual contains a few example charts/graphs for you to experiment with.

The last chapter is devoted to the more advanced Data-reduction tutorial.

To be honest, I prefered the C64 version to the C128 version, mainly because I think the screen layout is better.

There are a total of nine types of chart available. Pie chart, Horizontal Bars, Horizontal 3D Bars, Horizontal Graph, Vertical Bars, Vertical 3D Bars, Vertical Graph, X-Y Plot and Comparison Plot. Everything is Menu driven with built in safeguards should you make a mistake in your selection.

I must admit that I was pretty well impressed with some of the results that I managed to achieve after only a few hours 'tinkering about'.

Touchline

Adamsoft: *18 Norwich Ave, Rochdale, Lancs ON11 5JZ.* ***Tel:*** *0706 524304.*

Diskit 5

Disk users take heart. Here we provide a handy disk routine to convert memory to data statements.

By Les Allan

A pat on the back to all of those readers who noticed that we had printed the incorrect listing with the Diskit 5 article in April 1987 issue. Slapped wrists for us not noticing.

You will find reprinted here the full article together with a correct version of the Memory to DATA statements program.

There are occasions when it is desirable to convert a section of memory from machine code to a Basic program containing a re-boot and set of data instructions that represent the original machine's memory.

This program provides the user with the facility to 'read' sections of machine memory to do just that! In fact the Basic loader for this program was produced from the very same routine.

Using the Program

Start and end addresses are entered to control the range of memory to be converted. These are POKEd into the machine code routine resident at $C000 which re-locates the Basic loader and performs the operation of 'reading' each byte to provide two digit hex number in the data statement e.g.

$8000 00 90 00 90 43 42 4D 80
10 DATA 00,90,00,43,42,4D,80

This process is repeated for every byte within the range as previously specified. The completed data listing is then saved to disk as DATA and should be re-loaded prior to running to establish start of variables which begin at the end of the Basic loader.

The SYS address contained in the Basic loader is the warm start address and should be modified to that required by the nature of the area of memory being converted.

The program must be typed in exactly as listed and saved prior to running. Error trap routines are included to ensure that the data as read is correct. The program, when run, stores the relevant code at a temporary address of $8000 and when prompted relocates the working program to Basic ($0801) and saves to the program to disk.

```
PROGRAM: MEM-DATA BOOT
32   10 M1=32768:M2=35312:CH=0
97   11 PRINTCHR$(144)CHR$(147)
C8   12 POKE52,120:POKE56,120:POKE
     53280,15:POKE53281,12
94   13 PRINT
8F   14 PRINTSPC(8)CHR$(18)"[SU,S*
     22,SI]
26   15 PRINTSPC(8)CHR$(18)"[S-,SP
     C22,S-]
84   16 PRINTSPC(8)CHR$(18)"[S-,SP
     C4]DATA  STATEMENT[SPC3,S-]
3C   17 PRINTSPC(8)CHR$(18)"[S-,SP
     C22,S-]
E5   18 PRINTSPC(8)CHR$(18)"[S-]
     TO MEMORY  ROUTINE  [S-]
4A   19 PRINTSPC(8)CHR$(18)"[S-,SP
     C22,S-]
22   20 PRINTSPC(8)CHR$(18)"[S-,SP
     C5]BY LES ALLAN[SPC5,S-]
50   21 PRINTSPC(8)CHR$(18)"[S-,SP
     C22,S-]
6C   22 PRINTSPC(8)CHR$(18)"[SJ,S*
     22,SK]
A0   23 PRINT:PRINTCHR$(155)
42   24 PRINT" THIS ROUTINE READS
     THE DATA STATEMENT,"
80   25 PRINT
17   26 PRINT" CONVERTS FROM  HEX
     TO BINARY AND POKES"
82   27 PRINT
C4   28 PRINT" CODE BACK  TO THE
     AREA OF MEMORY FROM"
84   29 PRINT
19   30 PRINT" WHICH  IT  WAS  PRE
     VIOUSLY  GENERATED."
59   31 PRINT:PRINT
D0   32 READCODE$
BB   33 LB=ASC(RIGHT$(CODE$,1))-48
     :IFLB>9THENLB=LB-7
CF   34 HB=ASC(LEFT$(CODE$,1))-48:
     IFHB>9THENHB=HB-7
32   35 PRINTSPC(5)CHR$(5)"READING
      MEMORY BLOCK ...";M1:PRINTCH
     R$(145);
28   36 POKEM1,HB*16+LB:M1=M1+1:CH
     =CH+HB+LB:IFM1<M2THEN32
85   37 IFCH=31809THEN39
13   38 PRINT"CHECK SUM ERROR - CH
     ECK DATA STATEMENTS!":PRINTCH
     R$(19):END
EC   39 PRINT"  HIT REIJRN TO SAVE
      COMPLETED PROGRAM"
D1   40 GETKEY$:IFKEY$<>CHR$(13)TH
     EN40
56   41 SYS35216
10   42 :
CE   43 ::::::::::::::::::::: DATUM S
     TATEMENTS :::::::::::::::::::
16   44 :
AD   45 DATA 00,0B,08,00,00,9E,32,
     30,36,31,00,00,00,20,44,E5
2A   46 DATA A9,0C,8D,20,D0,8D,21,
     D0,EA,A9,36,85,01,4C,33,10
8C   47 DATA 00,97,35,33,32,38,30,
     2C,31,35,3A,97,35,33,32,38
7E   48 DATA 31,2C,31,32,00,65,08,
     0D,00,99,3A,99,3A,99,A6,36
7A   49 DATA 29,C7,28,31,38,29,22,
     D5,C0,1B,FA,C9,00,91,08,0E
14   50 DATA 00,99,A6,36,29,C7,28,
     31,38,29,22,DD,20,1B,FA,DD
2F   51 DATA 00,BD,08,0F,00,99,A6,
     36,29,C7,28,31,38,29,22,DD
DD   52 DATA 20,4D,45,4D,4F,52,59,
     20,54,4F,20,44,41,54,41,20
E0   53 DATA 53,54,41,54,45,4D,45,
     4E,54,53,20,DD,00,E9,08,10
40   54 DATA 00,99,A6,36,29,C7,28,
     31,38,29,22,DD,20,1B,FA,DD
8E   55 DATA 00,15,09,11,00,99,A6,
     36,29,C7,28,31,38,29,22,DD
90   56 DATA 20,07,FA,42,59,20,4C,
     45,53,20,41,4C,4C,41,4E,20
96   57 DATA 08,FA,DD,00,41,09,12,
     00,99,A6,36,29,C7,28,31,38
98   58 DATA 29,22,DD,20,1B,FA,DD,
     00,6D,09,13,00,99,A6,36,29
AF   59 DATA C7,28,31,38,29,22,CA,
     C0,1B,FA,CB,00,7D,09,14,00
54   60 DATA 99,C7,28,31,35,35,29,
     3A,99,3A,99,00,AB,09,15,00
7B   61 DATA 99,22,20,20,54,48,49,
     53,20,52,4F,55,54,49,4E,45
EC   62 DATA 20,20,54,41,48,45,53,
     20,43,4F,44,45,20,52,45,53
97   63 DATA 49,44,45,4E,54,20,49,
     4E,22,00,D9,09,16,00,99,22
BB   64 DATA 20,20,4D,45,4D,4F,52,
     59,20,41,4E,44,20,50,52,4F
DC   65 DATA 44,55,43,45,53,20,44,
     41,54,41,20,20,53,54,41,54
19   66 DATA 45,4D,45,4E,54,53,22,
     00,07,0A,17,00,99,22,20,20
04   67 DATA 50,52,4F,56,49,44,49,
     4E,47,20,41,20,20,4C,4F,41
84   68 DATA 44,45,52,20,46,4F,52,
     20,4D,2F,43,20,50,52,4F,47
D3   69 DATA 52,41,4D,53,22,00,13,
     0A,18,00,99,C7,28,35,29,3A
2E   70 DATA 99,00,3A,0A,19,00,85,
     22,20,06,FA,53,54,41,52,54
75   71 DATA 20,41,44,44,52,45,53,
     53,20,4F,46,20,43,4F,44,45
72   72 DATA 22,38,53,41,24,00,63,
     0A,1A,00,8B,C3,28,53,41,24
4F   73 DATA 29,B2,30,B0,C5,28,53,
     41,24,29,B2,30,A7,99,C7,28
28   74 DATA 31,34,35,29,C7,28,31,
     34,35,29,3A,89,32,35,00,89
D9   75 DATA 0A,1B,00,48,42,B2,85,
     28,C5,28,53,41,24,29,AD,32
28   76 DATA 35,36,29,3A,4C,42,B2,
     C5,28,53,41,24,29,AB,48,42
0B   77 DATA AC,32,35,36,00,A1,0A,
     1C,00,97,35,33,30,03,FA,2C
```

```
23  78 DATA 4C,42,3A,97,35,33,30,
    30,31,2C,48,42,00,A7,0A,1D
47  79 DATA 00,99,00,CE,0A,1E,00,
    85,22,20,06,FA,45,4E,44,20
C6  80 DATA 41,44,44,52,45,53,53,
    20,4F,46,20,43,4F,44,45,20
18  81 DATA 20,22,3B,45,41,24,00,
    DC,0A,1F,00,45,41,B2,C5,28
84  82 DATA 45,41,24,29,00,01,0B,
    20,00,8B,C3,28,45,41,24,29
7E  83 DATA B2,30,B0,45,41,B2,30,
    A7,99,C7,28,31,34,35,30,C7
F9  84 DATA 28,31,34,35,29,3A,89,
    33,30,00,43,0B,21,00,48,42
6D  85 DATA B2,B5,28,45,41,AD,32,
    35,36,29,3A,4C,42,B2,28,B5
02  86 DATA 28,28,45,41,AB,48,42,
    AC,32,35,36,29,AD,31,36,29
61  87 DATA AA,31,29,AC,31,36,3A,
    8B,4C,42,B2,32,35,36,A7,48
F5  88 DATA 42,B2,48,42,AA,31,3A,
    4C,42,B2,30,00,7C,0B,22,00
4D  89 DATA 45,41,24,B2,C4,28,28,
    48,42,AC,32,35,36,29,AA,4C
9F  90 DATA 42,29,3A,8B,C8,28,45,
    41,24,2C,31,29,B2,22,20,22
03  91 DATA A7,45,41,24,B2,C9,28,
    45,41,24,2C,C3,28,45,41,24
EA  92 DATA 29,AB,31,29,00,94,0B,
    23,00,97,35,33,30,30,32,2C
69  93 DATA 4C,42,3A,97,35,33,30,
    30,33,2C,48,42,00,C4,0B,24
96  94 DATA 00,4C,B2,C3,28,53,41,
    24,29,3A,81,4C,4C,B2,31,A4
1C  95 DATA 4C,3A,97,34,39,36,37,
    30,AA,4C,4C,2C,C6,28,CA,28
31  96 DATA 53,41,24,2C,4C,4C,2C,
    31,29,29,3A,82,00,F4,0B,25
18  97 DATA 00,4C,B2,C3,28,45,41,
    24,29,3A,81,4C,4C,B2,31,A4
48  98 DATA 4C,3A,97,34,39,36,37,
    39,AA,4C,4C,2C,C6,28,CA,28
98  99 DATA 45,41,24,2C,4C,4C,2C,
    31,29,29,3A,82,00,FF,0B,26
C6  100 DATA 00,9E,34,39,34,30,38
    ,00,05,0C,27,00,3A,00,29,0C
6C  101 DATA 28,00,3A,06,FA,4D,45
    ,4D,B0,59,20,AB,20,83,20,53
CB  102 DATA 54,41,54,45,4D,45,4E
    ,54,3A,06,FA,00,2F,0C,29,00
19  103 DATA 3A,00,57,0C,2A,00,3A
    ,06,FA,20,42,59,20,4C,45,53
39  104 DATA 20,41,4C,4C,41,4E,20
    ,31,33,2E,30,39,2E,38,36,20
35  105 DATA 3A,06,FA,00,FF,FA,00
    ,FF,FA,00,AC,FA,A9,00,85,FB
FE  106 DATA 85,FD,A9,10,85,FC,A9
    ,C0,85,FE,A0,00,B1,FB,91,FD
B3  107 DATA C8,D0,F9,E6,FC,E6,FE
    ,A5,FE,C9,D0,D0,EF,60,00,DE
23  108 DATA FA,A2,00,A0,00,AD,00
    ,CF,85,FD,AD,01,CF,85,FE,A0
6F  109 DATA 00,18,AD,00,CF,69,36
    ,8D,00,CF,91,FD,C8,90,03,EE
80  110 DATA 01,CF,AD,01,CF,91,FD
    ,C8,EE,02,CF,AD,02,CF,91,FD
19  111 DATA D0,03,EE,03,CF,C8,AD
    ,03,CF,91,FD,C8,A9,83,91,FD
A6  112 DATA C8,A9,20,91,FD,C8,8C
    ,FF,CF,AD,08,CF,85,FB,AD,09
CE  113 DATA CF,85,FC,A0,00,B1,FB
    ,AC,FF,CF,18,6A,04,FA,29,0F
BB  114 DATA C9,0A,30,03,18,69,07
    ,18,69,30,91,FD,C8,8C,FF,CF
2A  115 DATA A0,00,B1,FB,29,0F,C9
    ,0A,30,03,18,69,07,18,69,30
05  116 DATA AC,FF,CF,91,FD,C8,A9
    ,2C,91,FD,EE,08,CF,AD,08,CF
00  117 DATA D0,03,EE,09,CF,E8,E0
    ,10,D0,AA,A9,00,91,FD,18,AD
9C  118 DATA 0A,CF,CD,08,CF,D0,44
    ,AD,0B,CF,CD,09,CF,D0,3C,A9
B6  119 DATA 00,C8,91,FD,C8,91,FD
    ,EE,00,CF,EE,00,CF,AD,00,CF
90  120 DATA D0,03,EE,01,CF,A5,BA
    ,AA,A8,20,BA,FF,A9,04,A2,00
6D  121 DATA A0,CE,20,BD,FF,A9,01
    ,85,2B,A9,08,85,2C,A9,2B,AE
53  122 DATA 00,CF,AC,01,CF,20,D8
    ,FF,4C,66,FE,4C,00,C0,00,07
42  123 DATA FA,EE,08,FA,A9,00,85
    ,FB,A9,01,85,FD,A9,C2,85,FC
CA  124 DATA A9,08,85,FE,A0,00,B1
    ,FB,91,FD,C8,D0,F9,E6,FC,E6
07  125 DATA FE,A5,FC,C9,C6,D0,EF
    ,4C,00,C0,EE,DA,FA,17,08,0A
8F  126 DATA 00,4D,31,B2,20,05,FA
    ,3A,4D,32,B2,20,05,FA,00,29
25  127 DATA 08,0B,00,99,C7,28,31
    ,34,34,29,C7,28,31,34,37,29
F5  128 DATA 00,41,08,0C,00,97,35
    ,33,32,38,30,2C,31,35,3A,97
80  129 DATA 35,33,32,38,31,2C,31
    ,32,00,47,08,0D,00,99,00,6E
2E  130 DATA 08,0E,00,99,A6,38,29
    ,C7,28,31,38,29,22,D5,C0,16
54  131 DATA FA,C9,00,95,08,0F,00
    ,99,A6,38,29,C7,28,31,38,29
78  132 DATA 22,DD,20,16,FA,DD,00
    ,BC,08,10,00,99,A6,38,29,C7
D4  133 DATA 28,31,38,29,22,DD,20
    ,04,FA,44,41,54,41,20,20,53
14  134 DATA 54,41,54,45,4D,45,4E
    ,54,20,03,FA,DD,00,E3,08,11
69  135 DATA 00,99,A6,38,29,C7,28
    ,31,38,29,22,DD,20,16,FA,DD
1B  136 DATA 00,0A,09,12,00,99,A6
    ,38,29,C7,28,31,38,29,22,DD
66  137 DATA 20,20,54,4F,20,4D,45
    ,4D,4F,52,59,20,20,52,4F,55
55  138 DATA 54,49,4E,45,20,20,DD
    ,00,31,09,13,00,99,A6,38,29
79  139 DATA C7,28,31,38,29,22,DD
    ,20,16,FA,DD,00,58,09,14,00
FE  140 DATA 99,A6,38,29,C7,28,31
    ,38,29,22,DD,20,05,FA,42,59
9A  141 DATA 20,4C,45,53,20,41,4C
    ,4C,41,4E,20,05,FA,DD,00,7F
60  142 DATA 09,15,00,99,A6,38,29
    ,C7,28,31,38,29,22,DD,20,16
27  143 DATA FA,DD,00,A6,09,16,00
    ,99,A6,38,29,C7,28,31,38,29
00  144 DATA 22,CA,C0,16,FA,CB,00
    ,B4,09,17,00,99,3A,99,C7,28
81  145 DATA 31,35,35,29,00,E3,09
    ,18,00,99,22,20,54,48,49,53
8E  146 DATA 20,52,4F,55,54,49,4E
    ,45,20,52,45,41,44,53,20,54
30  147 DATA 48,45,20,44,41,54,41
    ,20,53,54,41,54,45,4D,45,4E
EE  148 DATA 54,2C,22,00,E9,09,19
    ,00,99,00,18,0A,1A,00,99,22
33  149 DATA 20,43,4F,4E,56,45,52
    ,54,53,20,46,52,4F,4D,20,20
8C  150 DATA 48,45,58,20,54,4F,20
    ,42,49,4E,41,52,59,20,41,4E
9E  151 DATA 44,20,50,4F,48,45,53
    ,22,00,1E,0A,18,00,99,00,4D
A6  152 DATA 0A,1C,00,99,22,20,43
    ,4F,44,45,20,42,41,43,48,20
35  153 DATA 20,54,4F,20,54,48,45
    ,20,20,41,52,45,41,20,4F,46
8B  154 DATA 20,4D,45,4D,4F,52,59
    ,20,46,52,4F,4D,22,00,53,0A
BA  155 DATA 1D,00,99,00,82,0A,1E
    ,00,99,22,20,57,48,49,43,48
0F  156 DATA 20,20,49,54,20,20,57
    ,41,53,20,20,50,52,45,56,49
E3  157 DATA 4F,55,53,4C,59,20,20
    ,47,45,4E,45,52,41,54,45,44
07  158 DATA 2E,22,00,BA,0A,1F,00
    ,99,3A,99,00,95,0A,20,00,B7
AB  159 DATA 43,4F,44,45,24,00,BB
    ,0A,21,00,4C,42,B2,C6,28,C9
1E  160 DATA 28,43,4F,44,45,24,2C
    ,31,29,29,AB,34,38,3A,8B,4C
4F  161 DATA 42,B1,39,A7,4C,42,B2
    ,4C,42,AB,37,00,E1,0A,22,00
50  162 DATA 48,42,B2,C6,28,C8,28
    ,43,4F,44,45,24,2C,31,29,29
77  163 DATA AB,34,38,3A,8B,48,42
    ,B1,39,A7,48,42,B2,48,42,AB
CB  164 DATA 37,00,14,0B,23,00,99
    ,A6,35,29,C7,28,35,29,22,52
6C  165 DATA 45,41,44,49,4E,47,20
    ,4D,45,4D,4F,52,59,20,42,4C
96  166 DATA 4F,43,4B,20,2E,03,FA
    ,22,38,4D,31,3A,99,C7,28,31
BA  167 DATA 34,35,29,3B,00,37,0B
    ,24,00,97,4D,31,2C,48,42,AC
2D  168 DATA 31,36,AA,4C,42,3A,4D
    ,31,B2,4D,31,AA,31,3A,8B,4D
D1  169 DATA 31,B3,4D,32,A7,33,32
    ,00,42,0B,25,00,9E,36,35,31
3E  170 DATA 32,36,00,48,0B,26,00
    ,3A,00,70,0B,27,00,3A,08,FA
88  171 DATA 4C,45,53,20,41,4C,4C
    ,41,4E,20,AB,20,31,33,2E,30
08  172 DATA 39,2E,38,36,3A,07,FA
    ,00,76,0B,28,00,3A,00,04,FA
3D  173 DATA EE,FF,FA,EE,FF,FA,EE
    ,FF,FA,EE,FF,FA,EE,FF,FA,EE
AB  174 DATA FF,FA,EE,FF,FA,EE,FF
    ,FA,EE,90,FA,44,41,54,41,00
F4  175 DATA 04,FA,EE,F8,FA,76,0B
    ,28,00,0D,FA,EE,E0,FA,60,EE
79  176 DATA 0E,FA,34,A2,00,BD,75
    ,10,9D,10,01,E8,D0,F7,A2,34
85  177 DATA BD,DC,10,9D,00,03,E8
    ,D0,F7,EA,EA,A2,FF,9A,A9,00
CF  178 DATA 85,2D,38,E9,01,85,FE
    ,A9,20,85,2E,E9,00,85,FF,A9
C9  179 DATA 32,85,FC,A9,10,85,FD
    ,AD,21,D0,85,FB,4C,52,01,00
8D  180 DATA 00,00,00,00,00,00,0B
    ,08,0A,00,9E,33,38,34,30,00
31  181 DATA 1D,08,0B,00,99,C7,28
    ,31,34,34,29,C7,28,31,34,37
1B  182 DATA 29,00,35,08,0C,48,C6
    ,FC,A5,FC,C9,FF,D0,02,C6,FD
CC  183 DATA 68,60,48,AD,20,D0,49
    ,03,8D,20,D0,C6,FE,A5,FE,C9
B3  184 DATA FF,D0,02,C6,FF,68,60
    ,A0,00,B1,FC,C9,FA,D0,18,EA
49  185 DATA EA,EA,20,30,01,B1,FC
    ,AA,20,30,01,B1,FC,91,FE,20
43  186 DATA 3D,01,CA,D0,F8,F0,05
    ,91,FE,20,3D,01,A6,FC,CA,86
67  187 DATA FC,E0,FF,D0,02,C6,FD
    ,A5,FE,C9,1F,A5,FF,E9,08,B0
69  188 DATA C8,A5,FB,8D,20,D0,A9
    ,37,85,01,20,60,A6,20,8E,A6
40  189 DATA A2,1F,BD,10,01,9D,00
    ,08,CA,D0,F7,A9,FA,4C,34,03
98  190 DATA 4C,AE,A7,EE,EE,EE,EE
    ,EE,EE,EE,EE,EE,EE,EE,EE,EE
E0  191 DATA EE,EE,EE,EE,EE,EE,EE
    ,EE,EE,EE,EE,EE,EE,EE,EE,EE
67  192 DATA EE,EE,EE,EE,EE,EE,EE
    ,EE,EE,EE,EE,EE,EE,EE,EE,EE
A6  193 DATA EE,EE,EE,EE,EE,EE,EE
    ,EE,EE,EE,EE,EE,EE,EE,EE,EE
65  194 DATA EE,EE,EE,EE,EE,EE,EE
    ,EE,EE,EE,EE,EE,EE,EE,EE,EE
A4  195 DATA EE,EE,EE,EE,EE,EE,EE
    ,EE,EE,EE,EE,EE,EE,EE,EE,EE
2B  196 DATA EE,EE,EE,EE,EE,EE,EE
    ,EE,EE,EE,EE,EE,EE,EE,EE,EE
2A  197 DATA EE,EE,EE,EE,EE,EE,EE
    ,EE,EE,EE,EE,EE,EE,EE,EE,EE
9F  198 DATA A9,00,A8,85,FB,85,FD
    ,A9,80,85,FC,A9,08,85,FE,B1
49  199 DATA FB,91,FD,C8,D0,F9,E6
    ,FC,E6,FE,A5,FC,C9,A0,D0,EF
74  200 DATA A5,BA,AA,A8,20,BA,FF
    ,A9,0E,A2,D4,A0,89,20,BD,FF
41  201 DATA A9,01,85,2B,A9,08,85
    ,2C,A9,2B,A2,85,A0,11,20,D8
84  202 DATA FF,4C,66,FE,4D,45,4D
    ,2D,44,41,54,41,20,4D,41,4B
A6  203 DATA 45,52,EE,EE,EE,EE,EE
    ,EE,EE,EE,EE,EE,EE,EE,EE,EE
F6  204 :
F7  205 :
4E  206 :::::::::::::::::::::::::::
    ::::::::::::
8D  207 :  MEMORY TO DATA STATEME
    NT MAKER  :
DE  208 :  WRITTEN BY :           L
    ES ALLAN  :
66  209 :  28 ATKINSON DRIVE  NEW
    PORT  IW  :
52  210 :::::::::::::::::::::::::::
    ::::::::::::
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Filemaster

There are many databases available for Commodore computers and the choice can sometimes be bewildering. To help, we've had a look at Robtek's Filemaster.

By George Duval

Good basic business packages for the Commodore 64 are few and far between. In particular, good databases are not prolific, mainly because the difference between a normal 'card-index' type database, and a full 'relational' database is more significant than most people think.

If all you want is a database to store names and addresses of friends, which will only need to be called up occasionally, then almost any simple record system will do. If however, you want to create a variety of fields, and then create reports on the similarties and/or differences between them, then a good relational database is essential.

This latest offering from Robtek, the company responsible for one of the first good multi-purpose cartridges for the Commodore 64, is a relational database for the Commodore 64 and 128. Thankfully, the company has had the good sense to slightly rewrite the program for the 128 so that it takes advantage of the 80 column mode.

Once you have loaded the program for the first time, you are presented with the first of a series of menus, this one being called the Job Menu. The options available from this menu are:

1. Expand file
2. File list on screen
3. Create a new file
4. Close index
5. Searching/change
6. Change diskette
7. Printing
8. Sort
9. Select another file

A. Quit
B. Disk routines

It is advised that first time users should automatically select option 3, however, in use, a disk must first be prepared on which to save your file. Options 1 and 2 are self explanatory, however option 3 is where the user establishes what form the databse will take, and therefore requires more description.

Setting Up

You must first name the six fields and, once this has been done, you can choose the size of each field – in characters – and then the amount of records you intend this databse to consist of. In the 128 version of *Filemaster*, you have the added ability to use numeric values, which can then be calculated with.

The close index option is essential to anyone creating a long database as in effect it updates the file each time it is used. If the computer then crashed, you will then at least have created an available index on the floppy. Search is a very standard facility for databases, and it is reasonably well implemented in *Filemaster*, although it does tend to be quite slow when working on long files.

If, during use, you wish to change disk, you must first close the disk you are working on, and then inform the computer that you are about to change disks – tiresome, but necessary. To print any or all of your file, option 7 is totally adequate, allowing for the printing of documents or labels. Sorting, another essential part of database is also included in Filemaster, and the sorts seem both good and fast, allowing any file to be organised very simply.

One neat inclusion is the disk routine option. It allows you to delete files, reorganise a disk, format a disk, reset your drive and rename a file. In 128 mode this option will also produce a directory of your drive, and tell you how much free space (in blocks) is available.

Verdict

Overall, *Filemaster* is a good, though by no means perfect, relational database. It lacks any form of report generation and thus limits its use for serious applications. What it does, it does well, although the manual is poor, and therefore a few hours of trial and error are necessary to make the most of any database. Nor is it exceptionally cheap. Priced as it is at £29.99, anyone considering purchasing this database should first check if it is suitable for your specific needs. YC

Touchline:
Robtek Ltd: *Unit 4, Isleworth Business Compes, St. Johns Road, Isleworth, Midds. TW7 6NL.* ***Tel:*** *01-847 4457.*
Price: *£29.99.*

Arcade Action

Get those sprites moving with these handy arcade routines.

By Tony Crowther

No matter how much time and thought you put into a game it is the quality of the graphics that makes people take a second look at it. If a game has a main character, or sprite, that looks more like a wedge of cheese than the latest hyper-galactic, fusion powered, light ship, complete with glowing engine and flashing lights, the chances are no one will bother to give your game a second look.

The routines presented here will enable you to control a sprite on a C64 with ease. Two routines are presented the first allows you to animate a sprite, so that you can move legs, helicopter rotors etc. The second routine allows you to move this sprite with ease.

Animation

In order to animate a sprite all that you are required to do is quickly change the definition of the sprite on the screen to a new one and so on until all of the different animations have been displayed, rather like the way that we animated characters in our last installment.

Let's say that in your latest game you wanted to animate a helicopter. The helicopter and its different animations could look something like the one shown in Figure 1. There are just two animations in our example so all that we need to do is swap between the two sprites in order to make it look as though the rotor is moving around.

The program "SPRITE ANIM LOAD" is a Basic loader for a machine code program that will allow you to achieve this type of animation with ease. For those interested, the machine code for this program is also included for you to follow through.

Sprites that are to be used with the animation routine must be placed in consecutive sprite positions, you can use positions 128 to 200. If you don't know about sprites then I suggest that you take a look at your manual or refer to the *Everyman's Guide to Graphics* article that appeared in the April 1987 issue of *Your Commodore*.

Before you can use the routine presented here you must have first loaded the IRQ DATABASE program that goes with this series and was published in the March 1987 issue of *Your Commodore*.

The routine presented here allows for eight different sprites to be animated on the screen at once. The syntax for the SYS call to start the animation of a sprite is:

SYS50480,No,1st Sprite Pos,No of frames,Speed

Where:
No is the sprite number, 0 to 7 are allowed.
1st Sprite Pos is the position of the first sprite in memory. You can use sprite positions 128 to 200.
No of frames is the number of animations that you require.
Speed is the speed of the animations. 1 is the fastest and 255 the slowest.

Procedure

1. Make sure that the IRQ database is running. SYS 49152 turns this on (don't forget to LOAD it first).
2. Tell the IRQ DATABASE that you are using the SPRITE ANIMATE routine by the following command:

   POKE 838,1

3. Start the Animation with the SYS 50480 command as detailed above.

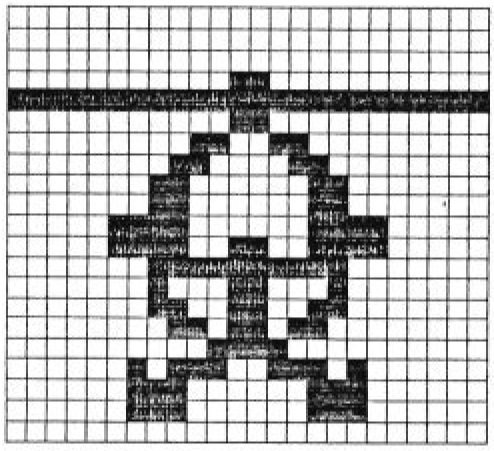
To make things a little clearer I have included the program SPRITE ANIM DEMO. This simply displays a series of sprites on the screen and procedes to move a dot diagonally across each sprite. This is not very stunning but it does demonstrate the way in which you can use the program.

Now that you can change your sprite looks like, let's get it moving.

Movement

The routine presented here allows you to move the specified sprite in either a vertical or horizontal direction.

The Basic loader "SPRITE MOVE LOAD" will place the necessary



HELICOPTER No.1

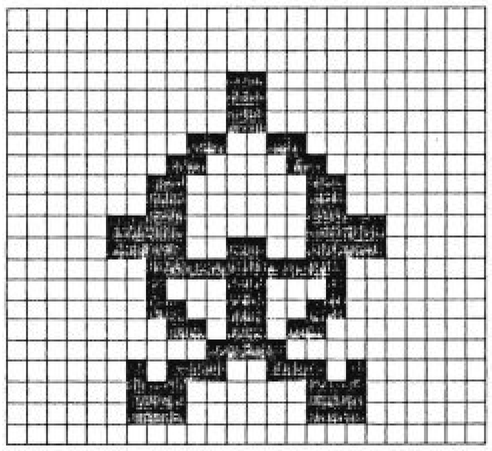


FIGURE 1

HELICOPTER No.2

machine code in memory for the routine. Again I also list the machine code program for those of you who want to see how the program works or use it from within machine code.

The way we start a sprite moving is with the command:

SYS 50180,No,x,y,xhi,dir,speed,-distance

Where:
No is the number of the sprite to move, 0 to 7.
X and Y are the x and y co-ordinate of the sprite.
XHI should be either a zero or one. A one is required if the sprite is over 255 pixels along the horizontal axis towards the right of the screen. See your manual for more details of this.
Direction is a number between 0 and 3 where:

0 is up the screen.
1 is left.
2 is down.
3 is right.

Speed should be between 1 and 255. 1 is the fastest and 255 the slowest.
Distance is the number of pixels across which you want to move the sprite. For example 0 will move the sprite 0 pixels and 100 will move the sprite 100 pixels across the screen.

As with the previous routine you must have set up the IRQ DATABASE program before calling it. Don't forget to make sure that the IRQ DATABASE is switched on and then start this routine with:

POKE 837,1.

Again I have produced a boring demo program, "SPRITE MOVE DEMO". This demonstration simply sets up a number of coloured blocks and moves them across the screen at different speeds.

Over To You

I have now given you enough information to allow you to get things moving by yourselves. Careful study of the two demo programs should make things clearer if you are stuck.

To prove to yourselves that you have got to grips with the routines why not try a couple of programming exercises.

1. Try to link together the two demo programs presented here so that the sprites that are moving are also animated.
2. Write a program that moves some sort of vehicle across the screen while animating some part of it, perhaps a car or a helicopter.

In the next installment I will show you how I would do each of the above. Plus, I will be taking a look at how to scroll messages and plot on the screen.

Important Note

As with most programs in this series the IRQ DATABASE program must be present in memory before running any of the programs. The IRQ DATABASE can be found in the March 1987 issue of *Your Commodore*.

YC

PROGRAM: SPRITE ANIM LOAD

```
D0  100 DATA160,0,140,99,159,32,
        253,174,1017
9A  101 DATA32,138,173,32,247,18
        3,165,20,990
EC  102 DATA172,99,159,153,92,15
        9,200,192,1226
20  103 DATA4,144,231,169,124,14
        1,100,192,1105
50  104 DATA169,197,141,101,192,
        173,92,159,1224
2A  105 DATA170,169,1,157,124,15
        9,169,0,949
57  106 DATA157,116,159,157,148,
        159,173,93,1162
4F  107 DATA159,157,100,159,157,
        248,7,173,1160
97  108 DATA94,159,157,140,159,1
        73,95,159,1136
CA  109 DATA157,108,159,96,173,7
        0,3,240,1006
25  110 DATA250,162,0,189,124,15
        9,240,42,1166
69  111 DATA254,116,159,189,116,
        159,221,108,1322
D2  112 DATA159,144,31,169,0,157
        ,116,159,935
33  113 DATA254,148,159,189,148,
        159,221,140,1418
D5  114 DATA159,144,5,169,0,157,
        148,159,941
B5  115 DATA189,100,159,24,125,1
        48,159,157,1061
2A  116 DATA248,7,232,224,8,208,
        204,96,1227
2B  200 POKE 53280 ,0
29  201 POKE 53281 ,0
5C  202 PRINT"[CLR,C5]"
40  203 A$= "[SPC6]"
1A  204 PRINTA$"*****************
        **********"
01  205 PRINTA$"*[SPC24]*"
79  206 PRINTA$"*[SPC4]SPRITE AN
        IMATION[SPC4]*"
87  207 PRINTA$"*[SPC5]MEM.50480
        -50615[SPC4]*"
06  208 PRINTA$"*[SPC24]*"
BE  209 PRINTA$"* POKE 838 ,1[SP
        C12]*"
28  210 PRINTA$"*[SPC24]*"
63  211 PRINTA$"* SYS 50480 ,SPR
        ITE N[SW].  *"
35  212 PRINTA$"*[SPC11],DATA N[
        SW].[SPC4]*"
98  213 PRINTA$"*[SPC11],ANIMATI
        ONS  *"
C9  214 PRINTA$"*[SPC11],SPEED[S
        PC7]*"
33  215 PRINTA$"*[SPC24]*"
```

```
3E   216 PRINTA$"****************
     ***********"
5E   300 LI -100 :FOR I - 50480 T
     O 50615 STEP8 :T -0 :FOR J -
     0 TO 7 :READ A
E6   301 POKE I+J ,A:T -T +A :NEX
     T J:READ A:IF A<>T THENPRINT
     "ERROR IN LINE "LI :END
05   302 LI -LI +1:NEXT I
```

SPRITE ANIM M/CODE

```
1000 ;******************************
1010 ;****    SPRITE ANINMATE    ****
1020 ;******************************
1030 ;
1040 ;HOW TO USE
1050 ;  BASIC            :  M/C
1060 ; --------------- : -----------
1070 ;                  :
1080 ;SYS50480,XX1,XX2: LDA #XX1
1090 ;,XX3,XX4         : STA 40796
1100 ;                  : LDA #XX2
1110 ;SEE TEXT FOR     : STA 40797
1120 ;NOTES ON XX?     : LDA #XX3
1130 ;                  : STA 40798
1140 ;                  : LDA #XX4
1150 ; POKE838,NO      : STA 40799
1160 ;                  : LDA #NO
1170 ; NO - 1:ON       : STA 838
1180 ; NO - 1:OFF      : JSR 50507
1190 ;                  :
1200 ;******************************
1210 ;
1220 JUMPTB - 49252 ;JMP TABLE
1230 FLAG - 838
1240 BASIC1 - 44797
1250 BASIC2 - 44426
1260 BASIC3 - 47095
1270 OP - 40796
1280 DATA - OP
1290 DATA1 - OP+8
1300 SPEED - OP+16
1310 SPEED1 - OP+24
1320 ONOFF - OP+32
1330 COUNT - OP+48
1340 COUNT1 - OP+56
1350 PAGE - 20
1360 MOBDAT - 2040
1370 * - 50480
1380 ;
1390 ;
1400 PROG1
1410  LDY #0 ;GET INFO FROM
1420 LOOP3 ;THE INSTRUCTION
1430  STY DATA+7
1440  JSR BASIC1
1450  JSR BASIC2
1460  JSR BASIC3
1470  LDA PAGE
1480  LDY DATA+7
1490  STA DATA,Y
1500  INY
1510  CPY #4
1520  BCC LOOP3
1530  LDA #<PROG2 ;CHAIN PROG2 ONTO
1540  STA JUMPTB ;THE MAIN IRQ
1550  LDA #>PROG2
1560  STA JUMPTB+1
1570  LDA DATA
1580  TAX
1590  LDA #1
1600  STA ONOFF,X ;ANIMATION ON
1610  LDA #0
1620  STA SPEED1,X
1630  STA COUNT1,X
1640  LDA DATA+1
1650  STA DATA1,X
1660  STA MOBDAT,X
1670  LDA DATA+2
1680  STA COUNT,X
1690  LDA DATA+3
1700  STA SPEED,X
1710 LOOP4
1720  RTS
1730 ;
1740 ;
1750 PROG2
1760  LDA FLAG ;CHECK FLAG
1770  BEQ LOOP4
1780  LDX #0
1790 LOOP5
1800  LDA ONOFF,X ;IS IT SWITCHED ON
1810  BEQ OUT1
1820  INC SPEED1,X ;CHECK SPEED COUNT
1830  LDA SPEED1,X
1840  CMP SPEED,X
1850  BCC OUT1
1860  LDA #0 ;RE-SET SPEED COUNT
1870  STA SPEED1,X
1880  INC COUNT1,X ;IN COUNT OF
1890  LDA COUNT1,X ;ANIMATION
1900  CMP COUNT,X
1910  BCC LOP11
1920  LDA #0
1930  STA COUNT1,X ;SPRITE DATA =
1940 LOP11 ;COUNT1+DATA1
1950  LDA DATA1,X
1960  CLC
1970  ADC COUNT1,X
1980  STA MOBDAT,X
1990 OUT1
2000  INX
2010  CPX #8 ;NEXT SPRITE
2020  BNE LOOP5
2030  RTS
2040 .END
```

PROGRAM: SPRITE ANIM DEMO

```
B0   1 POKE 53280 ,0
B4   2 POKE 53281 ,0
51   3 PRINT"[CLR]"
68   4 PRINT"[HOME,DOWN8,CS,SPC6]
     SPRITE ANIMATION DEMO"
5A   5 FOR I -0 TO 64*3
BE   6 POKE I +( 128 *64 ) ,255
EC   7 NEXT I
B3   8 FOR J - 3 TO 358 STEP 80
C3   9 FOR I - 3 TO 21 STEP 3
E7   10 POKE I+J +( 128 *64 ) ,19
     5
E0   11 NEXT I
E4   12 NEXT J
DD   20 SYS 49152    :REM START TH
     E IRQ
FA   21 POKE 838 ,1 :REM SWITCH O
     N OR OFF
F3   23 POKE 53269,0:REM SWITCH O
     FF SPRITES
D2   24 FOR I -0 TO 15
EC   25 POKE 53248 +I ,INT( RND(
     1) *150)+80
F1   26 NEXT I
FD   27 POKE 53269,255:REM SWITCH
      ON SPRITES
91   40 FOR I - 0 TO 7
22   41 POKE 2040 +I ,128
AC   42 POKE 53287 +I ,I +1:REM S
     ET COLOUR
9B   43 REM SET UP THE INFO FOR A
     NIMATION
8D   44 SYS 50480 ,I ,128 , 3, I*
     2+4
86   45 NEXT I
20   46 FOR I - 1 TO 1000
84   47 NEXT I
1E   48 GOTO 23
```

PROGRAM: SPRITE MOVE LOAD

```
B4   100 DATA169,123,141,97,192,1
     69,196,141,1228
A3   101 DATA98,192,162,0,169,1,1
     57,220,999
F7   102 DATA159,10,232,224,8,208
     ,247,160,1248
15   103 DATA0,140,163,159,32,253
     ,174,32,953
87   104 DATA138,173,32,247,183,1
     65,20,172,1130
F3   105 DATA163,159,153,156,159,
     200,192,7,1189
AB   106 DATA144,231,173,156,159,
     170,10,168,1211
86   107 DATA169,1,157,188,159,16
     9,0,157,1000
6C   108 DATA180,159,157,212,159,
     173,157,159,1356
B3   109 DATA153,0,208,173,158,15
     9,153,1,1005
AE   110 DATA208,173,160,159,157,
     164,159,173,1353
AE   111 DATA161,159,157,172,159,
     173,162,159,1302
BB   112 DATA157,204,159,173,16,2
     08,61,220,1198
CA   113 DATA159,240,3,32,252,196
     ,173,159,1214
C4   114 DATA159,240,3,32,7,197,9
     6,173,907
6B   115 DATA69,3,240,250,162,0,1
     60,0,884
DD   116 DATA189,188,159,240,41,2
     54,180,159,1410
84   117 DATA189,180,159,221,172,
     159,144,30,1254
EE   118 DATA169,0,157,180,159,18
     9,164,159,1177
05   119 DATA208,3,76,186,196,201
     ,2,208,1080
F8   120 DATA3,76,198,196,201,1,2
     08,3,886
89   121 DATA76,207,196,76,238,19
     6,232,200,1421
BD   122 DATA200,224,8,208,203,96
     ,185,1,1125
95   123 DATA208,56,233,1,153,1,2
     08,76,936
1A   124 DATA18,197,185,1,208,24,
     105,1,739
A0   125 DATA76,192,196,185,0,208
     ,56,233,1146
DA   126 DATA1,153,0,208,176,17,1
     73,16,744
AF   127 DATA208,61,220,159,240,6
     ,32,252,1178
71   128 DATA196,76,235,196,32,7,
     197,76,1015
19   129 DATA18,197,185,0,208,24,
     105,1,738
4A   130 DATA153,0,208,144,242,76
     ,218,196,1237
E9   131 DATA173,16,208,56,253,22
     0,159,141,1226
ED   132 DATA16,208,96,173,16,208
     ,24,125,866
25   133 DATA220,159,141,16,208,9
     6,254,212,1306
69   134 DATA159,189,212,159,221,
     204,159,144,1447
E7   135 DATA16,189,164,159,24,10
     5,2,41,700
57   136 DATA3,157,164,159,169,0,
     157,212,1021
59   137 DATA159,76,178,196,160,0
     ,140,99,1008
2B   200 POKE 53280 ,0
29   201 POKE 53281 ,0
5C   202 PRINT"[CLR,CS]"
40   203 A$= "[SPC6]"
1A   204 PRINTA$"****************
     **********"
01   205 PRINTA$"*[SPC24]*"
98   206 PRINTA$"*[SPC6]SPRITE MO
     VER[SPC6]*"
BA   207 PRINTA$"*[SPC5]MEM.50180
     -50479[SPC4]*"
06   208 PRINTA$"*[SPC24]*"
BF   209 PRINTA$"* POKE 837 ,1[SP
     C12]*"
28   210 PRINTA$"*[SPC24]*"
```

```
CA  211 PRINTA$"* SYS 50180 ,SPR
    ITE N[SW].   *"
10  212 PRINTA$"*[SPC11],XCO-ODC
    SPC6]*"
14  213 PRINTA$"*[SPC11],YCO-ODC
    SPC6]*"
E2  214 PRINTA$"*[SPC11],XHI BIT
    [SPC5]*"
C8  215 PRINTA$"*[SPC11],DIRECTI
    ON[SPC3]*"
C3  216 PRINTA$"*[SPC11],SPEED[S
    PC7]*"
28  217 PRINTA$"*[SPC11],DISTANC
    E[SPC4]*"
30  218 PRINTA$"*[SPC24]*"
3F  219 PRINTA$"*****************
    **********"
43  300 LI =100 :FOR I = 50180 T
    O 50479 STEP8 :T =0 :FOR J =
    0 TO 7 :READ A
E6  301 POKE I+J ,A:T =T +A :NEX
    T J:READ A:IF A<>T THENPRINT
    "ERROR IN LINE "LI :END
05  302 LI =LI +1:NEXT I
```

PROGRAM: SPRITE MOVE M/CODE

```
1000 ;*******************************
1010 ;****    MOVING SPRITES'    ****
1020 ;*******************************
1030 ;
1040 ;HOW TO USE
1050 ;   BASIC              :  M/C
1060 ; ---------------- : -----------
1070 ;SYS50180,XX1,XX2,: LDA #XX1
1080 ;XX3,XX4,XX5,XX6,X: STA 40860
1090 ;X7                : LDA #XX2
1100 ;                  : STA 40861
1110 ;                  : LDA #XX3
1120 ; SEE TEXT FOR     : STA 40862
1130 ; NOTES ON XX?     : LDA #XX4
1140 ;                  : STA 40863
1150 ;                  : LDA #XX5
1160 ; POKE 837 ,NO     : STA 40864
1170 ;                  : LDA #XX6
1180 ;                  : STA 40865
1190 ; NO= 1:ON         : LDA #XX7
1200 ;     0:OFF        : STA 40866
1210 ;                  : LDA #NO
1220 ;                  : STA 837
1230 ;                  : JSR 50207
1240 ;*******************************
1250 ;
1260 JUMPTB = 49249 ;JMP TABLE
1270 FLAG = 837
1280 BASIC1 = 44797
1290 BASIC2 = 44426
1300 BASIC3 = 47095
1310 OP = 40860
1320 DATA = OP
1330 DIR = OP+8
1340 SPEED = OP+16
1350 SPEED1 = OP+24
1360 ONOFF = OP+32
1370 DIST = OP+48
1380 DIST1 = OP+56
1390 BITS = OP+64
1400 PAGE = 20
1410 MOBX = 53248
1420 MOBY = 53249
1430 MOBXHI = 53264
1440 * = 50180
1450 ;
1460 ;
1470 PROG1
1480  LDY #0 ;GET INFO FROM
1490 LOOP3 ;THE INSTRUCTION
1500  STY DATA+7
1510  JSR BASIC1
1520  JSR BASIC2
1530  JSR BASIC3
1540  LDA PAGE
1550  LDY DATA+7
1560  STA DATA,Y
1570  INY
1580  CPY #7
1590  BCC LOOP3
1600  LDA #<PROG2 ;CHAIN PROG2 ONTO
1610  STA JUMPTB ;THE MAIN IRQ
1620  LDA #>PROG2
1630  STA JUMPTB+1
1640  LDX #0 ;EVAL BITS 1,2,4,..
1650  LDA #1
1660 LOOP2
1670  STA BITS,X
1680  ASL A
1690  INX
1700  CPX #8
1710  BNE LOOP2
1720  LDA DATA
1730  TAX
1740  ASL A
1750  TAY
1760  LDA #1
1770  STA ONOFF,X ;ANIMATE ON
1780  LDA #0
1790  STA SPEED1,X
1800  STA DIST1,X
1810  LDA DATA+1 ;PUT SPRITE ON
1820  STA MOBX,Y ;SCREEN
1830  LDA DATA+2
1840  STA MOBY,Y
1850  LDA DATA+4
1860  STA DIR,X
1870  LDA DATA+5
1880  STA SPEED,X
1890  LDA DATA+6
1900  STA DIST,X
1910  LDA MOBXHI ;SET THE HI BYTE
1920  AND BITS,X ;OF SPRITE IF
1930  BEQ LOP40 ;NEEDED
1940  JSR DECHI
1950 LOP40
1960  LDA DATA+3
1970  BEQ LOOP4
1980  JSR INCHI
1990 LOOP4
2000  RTS
2010 ;
2020 ;
2030 PROG2
2040  LDA FLAG ;CHECK FLAG
2050  BEQ LOOP4
2060  LDX #0
2070  LDY #0
2080 LOOP5
2090  LDA ONOFF,X ;IS IT SWITCHED ON
2100  BEQ OUT1
2110  INC SPEED1,X ;CHECK SPEED COUNT
2120  LDA SPEED1,X
2130  CMP SPEED,X
2140  BCC OUT1
2150  LDA #0 ;RE-SET SPEED COUNT
2160  STA SPEED1,X
2170  LDA DIR,X ;CHECK DIRECTION
2180  BNE NOTUP
2190  JMP MOVEU ;MOVE UP
2200 NOTUP
2210  CMP #2
2220  BNE NOTDO
2230  JMP MOVED ;MOVE DOWN
2240 NOTDO
2250  CMP #1
2260  BNE NOTLE
2270  JMP MOVEL ;MOVE LEFT
2280 NOTLE
2290  JMP MOVER ;MOVE RIGHT
2300 OUT1
2310  INX
2320  INY
2330  INY
2340  CPX #8 ;NEXT SPRITE
2350  BNE LOOP5
2360  RTS
2370 ;
2380 MOVEU
2390  LDA MOBY,Y ;DECREASE Y
2400  SEC
2410  SBC #1
2420 YJMP
2430  STA MOBY,Y
2440  JMP CHECK
2450 ;
2460 MOVED
2470  LDA MOBY,Y ;INCREASE Y
2480  CLC
2490  ADC #1
2500  JMP YJMP
2510 ;
2520 MOVEL
2530  LDA MOBX,Y ;DECREASE X
2540  SEC
2550  SBC #1
2560  STA MOBX,Y
2570  BCS XJMP ;EVAL HI BIT
2580 XJMP1
2590  LDA MOBXHI
2600  AND BITS,X
2610  BEQ LOP60
2620  JSR DECHI
2630  JMP XJMP
2640 LOP60
2650  JSR INCHI
2660 XJMP
2670  JMP CHECK
2680 ;
2690 MOVER
2700  LDA MOBX,Y ;INCREASE X
2710  CLC
2720  ADC #1
2730  STA MOBX,Y
2740  BCC XJMP ;EVAL HI BIT
2750  JMP XJMP1
2760 ;
2770 DECHI
2780  LDA MOBXHI ;DECREASE HI BIT
2790  SEC
2800  SBC BITS,X
2810  STA MOBXHI
2820  RTS
2830 ;
2840 INCHI
2850  LDA MOBXHI ;INCREASE HI BIT
2860  CLC
2870  ADC BITS,X
2880  STA MOBXHI
2890  RTS
2900 ;
2910 CHECK
2920  INC DIST1,X ;CHECK DISTANCE
2930  LDA DIST1,X ;FOR U-TURN
2940  CMP DIST,X
2950  BCC LOP50
2960  LDA DIR,X ;CHANGE DIRECTION
2970  CLC
2980  ADC #2
2990  AND #3
3000  STA DIR,X
3010  LDA #0
3020  STA DIST1,X ;RE-SET DISTANCE
3030 LOP50 ;COUNT
3040  JMP OUT1
3050 .END
```

SPRITE MOVE DEMO

```
B0  1 POKE 53280 ,0
B4  2 POKE 53281 ,0
49  4 PRINT"[CLR,DOWN3,CS,SPC6]M
    OVING SPRITE ANIMATION DEMO"
BA  5 FOR I =0 TO 63
8E  6 POKE I +( 128 *64 ) ,255
EC  7 NEXT I
F1  8 FOR I = 0 TO 7
8D  9 POKE 2040 ,I
E1  10 NEXT I
DD  20 SYS 49152   :REM START TH
    E IRQ
15  21 POKE 837 ,1 :REM SWITCH O
    N OR OFF
FD  27 POKE 53269,255:REM SWITCH
     ON SPRITES
91  40 FOR I = 0 TO 7
22  41 POKE 2040 +I ,128
AC  42 POKE 53287 +I ,I +1:REM S
    ET COLOUR
54  43 REM SET UP THE INFO FOR M
    OVEMENT
52  44 SYS 50180 ,I ,90 , 100 +I
    *10 ,0 ,I ,4 -( I /2 ) ,( I
    +1) *16
86  45 NEXT I
29  46 GOTO 46
```

Cross Reference

The most difficult part of any programmer's work must surely be debugging his product. Cross Reference will help you sort out your variables.

By D.J. Zimmer

Variables are used innumerable times in programs written by those who use Basic.

However, when it comes to debugging the program, they can prove a real headache, as you work your way laboriously through a listing trying to track down occurences of each and every variable.

This Cross Reference program, has been written with the purpose of making this task a whole lot easier.

Cross Reference works by scanning your Basic program and producing a variable name followed by a comprehensive list of lines in which this particular variable occurs. You can do this with all the variables you have used and thus keep track of how your program is structured.

Getting It In

In order to run the Cross Reference program, enter the following (in direct mode):

LOAD "your prog" (the name of the Basic program to be listed)
POKE (PEEK(46)+1)*256,0
POKE 44,PEEK(46)+1
LOAD "BXREF" (BXREF is the name of the Cross Reference lister)
RUN

When the lister program is running:

1. Enter Y or N (for Yes or No) when asked "Do you want output on printer?"

2. If you have requested output to a printer, you will be asked: "What is your program name?". Now enter the name of the program to be listed. The name will appear at the head of the printed listing.

3. Cross Reference will then begin to scan the Basic program. It will indicate its progress by displaying the current line number being processed on the screen.

4. When the scan is complete the Cross Reference will be displayed on the screen. If printed output has been requested then the printed listing will be produced. If, however, a printed output has not been requested, then, each time the screen has filled with listing, its contents will be held and you will be asked to press the F1 key to continue. When you have pressed F1, the next full screen will be displayed and so on.

5. On very rare occasions, the Basic program may have too many variables or too many references for the lister to handle.

If there are too many variables then, during step 3, the lister will display the following message:

Dictionary full for xxx (xxx is the variable name)

If this occurs, then look for the statement

NN=60

in line 10. NN represents the number of variables that the lister can process. Change the value 60, to accommodate the extra variables.

If there are too many references for a particular variable then, again during step 3, the lister will display the message:

References full for xxx

If this occurs then look for the statement

NR=100

in line 10. NR represents the number of references that the lister can handle per variable. Change the value 100, to accommodate the extra references.

Program Structure

Line	Operation
1-80	: Solicit option.
200-950	: Scan of Basic program text. Searches for names in each line. Adds name and line number to dictionary by involving a subroutine at line 200.
1000-1130	: Sorts dictionary entries into alphabetical order.
1200-1510	: Prints cross reference by scanning through dictionary.
2000-2500	: Adds a new entry to the dictionary. The name is added, if new, along with the line number being scanned.
3000-3060	: Subroutine to check for full screen when displaying cross references.

Main Variables

DR$	: Array containing names of variables found in Basic program.
RF%	: Array containing references for each variable contained in DR$. Each reference is held as 'line no.-32768' to ensure that all numbers from 0 to 65535 can be held.
RI	: Array containing number of references per variable.
AL	: Array containing DR$ subscripts in alphabetical order.
CL	: Current line number.
CC	: Current byte being scanned.
NL	: Address of link field to next Basic line.
R$	: Inidicates whether printer required -Y, or not -N.

```
PROGRAM: BASIC X REF

ED  1 REM **CROSS-REFERENCE FOR
    BASIC PROGRAMS, BY D J ZIMME
    R**
43  10 NN-60:NR-100
E1  20 DIMDR$(NN),RF%(NN,NR),RI(
    NN),AL(NN)
5C  30 PRINT"[CLR]"
07  40 INPUT"DO YOU WANT OUTPUT
    ON PRINTER(Y/N)";R$
2B  50 IFR$-"N"THEN100
2F  60 IFR$<>"Y"THEN40
55  70 OPEN4,4
60  80 INPUT"WHAT IS YOUR PROGRA
    M NAME";PN$
EB  100 REM
07  200 REM***MAIN SCAN***
51  210 NL-2049:PRINT"[CLR]"
81  220 CL-PEEK(NL+2)+256*PEEK(N
    L+3)
6F  230 PRINT"PROCESSING LINE NU
    MBER ";CL
DA  240 CU-NL+4
63  250 REM***FOR EACH LINE***
76  260 CC-PEEK(CU)
00  270 IFCC<>34THEN400
12  280 CU-CU+1:CC-PEEK(CU):IFCC
    -0THEN900
2A  290 IFCC<>34THEN280
B5  300 CU-CU+1:GOTO800
89  400 IFCC<65ORCC>90THEN600
0E  410 NM$-CHR$(CC)
21  420 CU-CU+1:CC-PEEK(CU)
99  430 IFCC>64ANDCC<91THEN500
39  440 IFCC>47ANDCC<58THEN500
F4  450 IFCC<36ORCC>37THEN510
32  500 NM$-NM$+CHR$(CC):GOTO420

F4  510 GOSUB2000
BB  520 GOTO800
84  600 IFCC-143THEN900:REM***RE
    M***
07  650 CU-CU+1
46  800 IFPEEK(CU)<>0THEN260
4D  900 NL-PEEK(NL)+256*PEEK(NL+
    1)
6E  950 IFPEEK(NL)<>0ORPEEK(NL+1
    )<>0THEN220
4A  1000 REM***DICTIONARY SORT**
    *
BB  1010 PRINT:PRINT"[SPC13]STAR
    TING SORT"
24  1020 FORT-1TODI:AL(T)-T:NEXT
    T
38  1025 LV-DI
A4  1030 IFLV<2THEN1200
46  1050 SW-0
13  1060 FORI-1TOLV-1
82  1070 IFDR$(AL(I))<-DR$(AL(I+
    1))THEN1120
81  1080 SW-1:T-AL(I+1)
4A  1090 AL(I+1)-AL(I):AL(I)-T
2F  1120 NEXTI
CA  1130 IFSW-1THENLV-LV-1:GOTO1
    030
14  1200 REM***DICTIONARY PRINT*
    **
F3  1210 IFR$-"N"THEN1220
BA  1215 PRINT#4:PRINT#4,CHR$(14
    )" CROSS-REFERENCE FOR ";PN$
    :PRINT#4,CHR$(15)
1E  1220 PRINT"[CLR]  [RVSON]CRO
    SS-REFERENCE[RVSOFF]":PRINT:
    LN=3
C1  1230 IFDI-0THEN1500
6C  1240 FORI=1TODI
66  1250 PRINTDR$(AL(I));TAB(10)
    ;
C9  1260 IFR$-"Y"THENPRINT#4,DR$
    (AL(I));:PRINT#4,CHR$(16)"10
    ";
2B  1270 FORJ-1TORI(AL(I))
E8  1280 PRINTRF%(AL(I),J)+32768
    ;
28  1290 IFR$-"Y"THENPRINT#4,RF%
    (AL(I),J)+32768;
9A  1300 IFJ/4-INT(J/4)THENPRINT
    :LN-LN+1:GOSUB3000:PRINTTAB(
    10);
91  1310 IFR$-"Y"THENIFJ/8-INT(J
    /8)THENPRINT#4:PRINT#4,CHR$(
    16)"10";
F9  1320 NEXTJ
9D  1330 PRINT:LN-LN+1:GOSUB3000

66  1340 IFR$-"Y"THENPRINT#4
12  1350 NEXTI
2B  1500 IFR$-"Y"THENPRINT#4:CLO
    SE4
6B  1510 END
7B  1999 REM***ADD TO DICTIONARY
    **
D1  2000 IFDI-0THEN2100
AD  2010 FORJ1-1TODI
A4  2020 IFDR$(J1)-NM$THEN2200
F0  2030 NEXTJ1
69  2100 IFDI<NNTHEN2180
C1  2110 PRINT"[RVSON]DICTIONARY
     FULL FOR [RVSOFF]";NM$
3E  2120 IFR$-"Y"THENPRINT#4,CHR
    $(18)"DICTIONARY FULL FOR ";
    NM$
D4  2130 RETURN
30  2180 DI-DI+1:J1-DI:DR$(DI)-N
    M$
D2  2200 IFRI(J1)<NRTHEN2280
64  2210 PRINT"[RVSON]REFERENCES
     FULL FOR ";NM$;"[RVSOFF]"
CB  2220 IFR$-"Y"THENPRINT#4,CHR
    $(18)"REFERENCES FULL FOR ";
    NM$
30  2230 RETURN
B5  2280 RI(J1)-RI(J1)+1
CE  2290 RF%(J1,RI(J1))-CL-32768

43  2500 RETURN
AD  2999 REM***CHECK FOR FULL SC
    REEN***
BE  3000 IFR$-"Y"THENRETURN
08  3020 IFLN<22THENRETURN
26  3030 PRINT:PRINT"[RVSON]HIT
    F1 TO CONTINUE[RVSOFF]";
7E  3040 GETI$:IFI$<>CHR$(133)TH
    EN3040
0A  3050 LN=0:PRINT"[CLR]";
71  3060 RETURN
```

Hex Data Entry II

An updated version of our machine code entry program.

By M.C. Stretton assisted by P.A. Eves

The *Your Commodore* Hex Data Entry program has been written with you, the reader in mind. No longer will it be a painstaking ordeal, typing in all the long list of data. This program will ensure a 100% correct entry, each and every time you use it.

It has become apparent that a number of people are experiencing problems using an earlier version of this program. The program presented here is an update of this version and cures any problems that we are aware of.

For your own safety, do not use the first version of Hex Data Entry.

On first entering the Hex Data Entry, only the LOAD DATA and DATA ENTRY options are available to you. This is because the buffer is empty, and the other two options require data to be present. On selecting the LOAD DATA option, you are asked for TAPE or DISK. Press either 'T' or 'D' then RETURN. The program remembers the last Input/Output, and so it is possible to just hit RETURN if the correct device type is being displayed. You are then required to enter a filename.

If you should make an error in your filename entry, you may either delete single characters by the DEL key, or SHIFT/CLRHOME will delete the whole filename. After the prompt, hit return and the file will be loaded into the buffer. The program will allow files up to 95 blocks in length to be loaded in. If you want larger programs to be entered, you will have to split them into two or more parts first.

The SAVE option is identical to the LOAD, except that it takes the contents of the buffer and saves them out to the given start address. This will save an executable file, that can be loaded and run, independent of the Input program.

Data Entry

The Data Entry option is the option by which you can enter data from *Your Commodore*, or your own creations. Once this option is selected you are asked if you want to continue from the given address. If you have just 'LOADed' a file, this address will be the next available byte in the buffer. (Allowing you to add more data to the end of the loaded file). Therefore if you wish to continue typing in at the last address, type 'Y'. If 'N' is pressed the program assumes you are starting a fresh entry. When this happens the buffer is reset to zero, thus losing any program currently in memory. (I have chosen $C000 as the normal start up address purely because most M/C progs reside here). After pressing 'N', you are then asked for the starting address, in Hex. Any valid Hex number is acceptable, e.g. $400, $C00, $C0400. In this example, the first figure, $400, would be interpreted as $0400 by the program. Likewise $286 is taken to be $0286.

Once the start address is given, you are asked if you want checksums or not. If you are typing in a program from *Your Commodore* your response will be 'Y'.

The screen display now changes to show the current address being poked into. Type any valid Hex number and the program automatically skips the next byte without the need to type commas, spaces or returns. If you make a mistake, one press of the DEL key will erase the whole number. If in the no checksum mode, when you get to the end of the line, the line will automatically scroll up ready for your next input.

If in checksum mode, after eight bytes are entered you must type the two digit checksum at the end of the line. Unlike the no checksum mode you now press return to enter the line.

If the program finds that the checksum does not match the line entered, a warning tone will be sound. You will then be asked if you wish to either: a) Re-enter the line or b) Re-enter the checksum.

After checking your line, if you find you have entered it wrongly, then press 'L'. The line will be erased and you then re-enter it correctly. If you find that you have only made a mistake in typing in the checksum, then press 'C' and re-enter it. Should you wish to stop entering data, simply press return

or space bar on a blank line to get you back to the main menu. Here you may SAVE your program so as to restart another day, or you may wish to see a printout.

On choosing the print option, you have a choice of hard copy or screen copy. The listing can be paused at any time by pressing down and holding down any key. Pressing the RUN/STOP key and holding it down will break out of the print mode and return you to the main menu.

The left arrow key 'top left of the keyboard', acts as zero when typing in your data. The space bar acts as the return key when entering data, thus leaving you free from searching for the return key.

I hope that this program will help to take the drudgery out of typing in long lists of data statements.

PROGRAM: HEX DATA ENTRY II

```
83 1 POKE788,52:CLR:BU=16384
A9 2 DV=8:CB=16384:POKE650,128:POKE53280,12:POKE53281,12:POKE646,1:PRINT"[CLR,REV H,REV SN]"
AD 3 LN=0:CA$="$C000":CA=49152:SA=CA
BC 4 GOSUB212
74 5 PRINT"[CLR]";
CD 6 PRINT"[HOME,RVSOFF,BLACK,C@40]";
D4 7 PRINT"[RVSON,BLACK] YOUR COMMODORE HEX INPUTTER - (C) 1986 ";
F3 8 PRINT"[RVSON] -DESIGNED AND WRITTEN BY M C STRETTON- [RVSOFF]";
86 9 PRINT"[WHITE,DOWN6,RIGHT13][F1] LOADS DATA"
45 10 PRINT"[DOWN2,RIGHT13][F3] SAVES DATA"
36 11 PRINT"[DOWN2,RIGHT13][F5] ENTER DATA"
AE 12 PRINT"[DOWN2,RIGHT13][F7] PRINT DATA"
B8 13 GOSUB125
81 14 ONFKGOSUB164,176,16,84
8C 15 GOTO6
2E 16 GOSUB197
C3 17 PRINT"[HOME,DOWN,BLACK,RVSON]CONTINUE FROM[SPC27,UP,RIGHT14]";CA$
9E 18 POKE198,0:WAIT198,1:GETA$
D4 19 IFA$="N"THENCB=16384:GOTO22
F4 20 IFA$="Y"THENPRINT"[WHITE]";:GOTO24
F5 21 GOTO18
72 22 PRINT"[HOME,DOWN,BLACK,RVSON]DATA ADDRESS: $....[SPC20,UP,RIGHT15]";
26 23 GOSUB132:PRINT"[WHITE,RVSOFF]";:HH$=IN$:GOSUB120:SA=DE:CA=DE:CA$=HH$:LN=0
15 24 PRINT"[HOME,DOWN,BLACK,RVSON,SPC4]DO YOU WISH TO ENTER CHECKSUMS?[SPC5,RVSOFF]";
C7 25 POKE198,0:WAIT198,1:GETA$
81 26 IFA$="N"THENCF=1:GOTO29
EE 27 IFA$="Y"THENCF=0:GOTO29
F2 28 GOTO25
53 29 PRINT"[CLR,WHITE]";
25 30 SYS59626
F9 31 GOSUB61
89 32 IN$=""
24 33 GOSUB125
DD 34 L=LEN(IN$)
B4 35 IFA$=CHR$(20)THENGOSUB57:GOTO33
D1 36 IFA$=CHR$(13)ANDBE=0THENPRINT"[CLR]":RETURN
C9 37 IFA$=CHR$(32)ANDBE=0THENPRINT"[CLR]":RETURN
46 38 IFA$="←"THENA$="0":GOTO42
A5 39 Y=0:IFASC(A$)>47ANDASC(A$)<58THENY=1
1B 40 IFASC(A$)>64ANDASC(A$)<71THENY=1
22 41 IFY=0THEN33
6D 42 PRINTA$;:DN=DN+1:IFDN=2THENPRINT" ";:GOTO44
A9 43 IN$=IN$+A$:GOTO33
79 44 IN$=IN$+A$
26 45 HH$=IN$:GOSUB120
D1 46 POKE CB,DE:CA=CA+1:CB=CB+1:DN=0:BE=BE+1:IN$=""
7B 47 IFBE=8ANDCF=1THENGOTO30
39 48 IFBE=8ANDCF=0THENPRINT"[RIGHT3]";:GOSUB71:GOSUB65
FF 49 IFBE=8ANDCC$=UC$THENGOTO30
25 50 IFBE=8ANDCC$<>UC$THENGOSUB202:GOTO52
DE 51 GOTO33
6A 52 LN=LN-1:ONEFGOTO56,53
36 53 PRINT"[HOME,WHITE,DOWN24,RIGHT37]";
29 54 PRINT"..[LEFT5]";
CA 55 GOTO48
DB 56 CB=CB-8:CA=CA-8:GOTO31
41 57 IFBE=0THENGOSUB59:RETURN
10 58 IFDN=0THENPRINT"[LEFT3]..[LEFT2]";:BE=BE-1:CB=CB-1:CA=CA-1:IN$="":RETURN
B6 59 IFL=>1THENIN$=LEFT$(IN$,L-1):PRINT"[LEFT].[LEFT]";:DN=DN-1
B2 60 RETURN
F3 61 DE=CA:GOSUB113:CA$=LEFT$("$0000",5-LEN(HH$))+HH$
FB 62 PRINT"[HOME,DOWN24,RIGHT,WHITE]";CA$;"[SPC4].. .. .. .. .. .. .. ..";
B8 63 IFCF=0THENPRINT"  : ..";
A1 64 PRINT"[HOME,DOWN24,RIGHT10]";:BE=0:DN=0:IN$="":RETURN
88 65 CH=0:CC$=""
D8 66 IFCA=SATHENRETURN
64 67 FORX=1TO8:CH=CH+(X*(PEEK((CB-9)+X))):NEXT
95 68 CH=CH+(LN*8)
F0 69 DE=CH:GOSUB113:CC$=MID$(HH$,3):LN=LN+1
C8 70 RETURN
22 71 POKE198,0:UC$=""
C6 72 GETL$:IFL$=""THEN72
DF 73 L=LEN(UC$):IFL$=CHR$(20)ANDL>0THEN75
CC 74 GOTO76
4G 75 UC$=LEFT$(UC$,L-1):PRINT"[LEFT].[LEFT]";:GOTO72
6F 76 IFL$=CHR$(13)ANDL=2THENCK=VAL(UC$):RETURN
D2 77 IFL$=" "ANDL=2THENCK=VAL(UC$):RETURN
0B 78 IFL$="←"THENL$="0"
97 79 Y=0:IFASC(L$)>47ANDASC(L$)<58THENY=1
2D 80 IFASC(L$)>64ANDASC(L$)<71THENY=1
FF 81 IFY=0ORL=2THEN72
6E 82 PRINTL$;
67 83 UC$=UC$+L$:GOTO72
AE 84 IFCA=SATHENRETURN
CC 85 LN=0:GOSUB197:PRINT"[HOME,DOWN,RVSON,BLACK,SPC3]PRINT TO SCREEN [S] OR PRINTER [P][SPC3]"
F5 86 PRINT"[UP2,RVSON,SPC3]BEWARE: ENTIRE BUFFER GETS PRINTED[SPC3]"
A2 87 PRINT"[UP,RVSON,SPC3]ANY OTHER KEY RETURNS TO MAIN MENU[SPC3]"
84 88 POKE198,0:WAIT198,1
67 89 GETK$
BC 90 IFK$=""THEN89
69 91 IFK$="S"THENNU=3:GOTO96
A6 92 IFK$="P"THENNU=4:GOTO94
00 93 PRINT"[WHITE,CLR]":RETURN
74 94 PRINT"[HOME,DOWN,BLACK,RVSON]  SWITCH ON PRINTER THEN PRESS RETURN[SPC3]"
DD 95 POKE198,0:WAIT198,1:GETA$:IFA$<>CHR$(13)THEN94
1E 96 OPEN3,NU:PRINT#3
F3 97 PS=16384:PE=16384+(CA-SA):PC=PS:AS=SA:IFPE=PSTHEN112
50 98 PRINT"[CLR]"
29 99 IFPEEK(203)<>64THEN99
35 100 DE=AS:GOSUB113:CA$=LEFT$("0000",4-LEN(HH$))+HH$
D6 101 CK=0:PRINT#3,"[SPC4]";CA$;
30 102 FORX=0TO7:Q=FRE(0)
8E 103 DE=PEEK(PC+X):GOSUB113:B$=RIGHT$(HH$,2)
4D 104 PRINT#3," ";B$;:NEXTX
64 105 GOSUB198
B1 106 PRINT#3," :"+CC$
D5 107 PC=PC+8:AS=AS+8
D6 108 IFPC<PETHENGOTO99
07 109 IFNU=3THENPOKE198,0:WAIT198,1
97 110 PRINT"[CLR]";
2D 111 DE=AS:GOSUB113:CA$=LEFT$("$0000",5-LEN(HH$))+HH$
DE 112 POKE198,0:PRINT#3:CLOSE3:PRINT"[CLR]":RETURN
F9 113 A=INT(DE/256):B=DE-A*256:C=INT(A/16):D=A-16*C
21 114 C$=CHR$(48+C):IFC>9THENC$=CHR$(C+55)
E3 115 D$=CHR$(48+D):IFD>9THEND$=CHR$(D+55)
4G 116 E=INT(B/16):F=B-16*E
9E 117 E$=CHR$(48+E):IFE>9THENE$=CHR$(E+55)
18 118 F$=CHR$(48+F):IFF>9THENF$=CHR$(F+55)
86 119 HH$=C$+D$+E$+F$:RETURN
```

```
B7 120 IFLEN(HH$)<4THENHH$=LEFT$("0000"+HH$,4-LEN(HH$))+HH$
30 121 A=ASC(HH$)-48:B=ASC(MID$(HH$,2,1))-48
88 122 C=ASC(MID$(HH$,3,1))-48:D=ASC(MID$(HH$,4,1))-48
08 123 DE=256*(16*(A+7*(A>9))+B+7*(B>9))+16*(C+7*(C>9))+D+7*(D>9)
F2 124 RETURN
04 125 FK=0:Q=FRE(0)
A2 126 POKE198,0:WAIT198,1:GETA$
DD 127 IFA$=CHR$(133)THENFK=1
2E 128 IFA$=CHR$(134)THENFK=2
35 129 IFA$=CHR$(135)THENFK=3
3C 130 IFA$=CHR$(136)THENFK=4
0D 131 RETURN
F5 132 IN$=""
65 133 GETL$:IFL$=""THEN133
5D 134 L=LEN(IN$):IFL$=CHR$(20)ANDL>0THEN136
43 135 GOTO137
85 136 IN$=LEFT$(IN$,L-1):PRINT"[LEFT].[LEFT]";:GOTO133
71 137 IFL$=CHR$(13)ANDL>0THENRETURN
85 138 IFL$=CHR$(32)ANDL>0THENRETURN
F3 139 FLAG=0:IFASC(L$)>47ANDASC(L$)<58THENFLAG=1
CC 140 IFASC(L$)>64ANDASC(L$)<71THENFLAG=1
7A 141 IFFLAG<>1THENGOTO133
08 142 IFL=4THENGOTO133
81 143 PRINTL$;
1E 144 IN$=IN$+L$:GOTO133
F9 145 FORX=1TO16:POKE832+X,32:NEXT
39 146 PRINT"[HOME,DOWN,RVSON,BLACK]FILENAME: [[SPC16]][SPC12,UP,RIGHT11]";
B7 147 FL$=""
56 148 GETA$:IFA$=""THEN148
CF 149 L=LEN(FL$)
24 150 IFA$=CHR$(20)ANDL>0THEN153
ED 151 IFA$="[CLR]"THEN145
AC 152 GOTO155
08 153 FL$=LEFT$(FL$,L-1):PRINT"[LEFT] [LEFT]";
A8 154 GOTO148
56 155 IFA$=CHR$(13)ANDL>0THEN161
72 156 IFA$=CHR$(32)THEN158
88 157 IFASC(A$)<32ORASC(A$)>90THEN148
54 158 IF L=16THEN148
9E 159 PRINTA$;
1D 160 FL$=FL$+A$:GOTO148
64 161 FORX=1TOLEN(FL$):POKE832+X,ASC(MID$(FL$,X,1)):NEXT
09 162 POKE183,L
2D 163 RETURN
9D 164 GOSUB197:GOSUB188:GOSUB145
8C 165 IFDV=1THENPRINT"[HOME,DOWN,BLACK,RVSON]  PLACE TAPE IN DECK THEN PRESS 'PLAY'  [CS]":GOTO171
55 166 PRINT"[HOME,DOWN,BLACK,RVSON] PLACE DISK INTO DRIVE THEN HIT RETURN  [CS]"
36 167 POKE198,0:WAIT198,1:GETA$:IFA$<>CHR$(13)THEN167
4D 168 PRINT"[HOME,DOWN,BLACK,RVSON]LOADING[SPC33]"
10 169 PRINT"[RVSON,UP3,RIGHT8]";FL$
90 170 SYS49244:GOTO172
E6 171 SYS49152
59 172 A=PEEK(829):B=PEEK(830):C=PEEK(831):D=PEEK(832)
76 173 SA=(256*B)+A:CA=(256*D)+C:SZ=CA-SA:CB=BU+SZ:LN=INT(SZ/8)
A4 174 DE=CA:GOSUB113:CA$=LEFT$("$0000",5-LEN(HH$))+HH$
21 175 RETURN
D2 176 IFCA=SATHENRETURN
86 177 GOSUB197:GOSUB188:GOSUB145
B8 178 A=SA-INT(SA/256)*256:B=INT(SA/256):POKE829,A:POKE830,B
B0 179 C=CA-INT(CA/256)*256:D=INT(CA/256):POKE831,C:POKE832,D
B2 180 IFDV=1THENPPRINT"[HOME,DOWN,BLACK,RVSON]PLACE TAPE IN DECK THEN PRESS 'REC-PLAY'[CS]":SYS49203
CD 181 IFDV=1THENSYS49206:RETURN
05 182 PRINT"[HOME,DOWN,BLACK,RVSON] PLACE DISK INTO DRIVE THEN HIT RETURN  [CS]"
D4 183 POKE198,0:WAIT198,1:GETA$:IFA$<>CHR$(13)THEN183
87 184 PRINT"[HOME,DOWN,BLACK,RVSON]SAVING[SPC34]"
73 185 PRINT"[RVSON,UP3,RIGHT7]";FL$
D3 186 SYS49343
35 187 RETURN
32 188 PRINT"[HOME,DOWN,BLACK,RVSON]TAPE OR DISK:[SPC27]";
52 189 IFDV=1THENPRINT"[HOME,DOWN,RIGHT14]TAPE[SPC22]";
45 190 IFDV=8THENPRINT"[HOME,DOWN,RIGHT14]DISK[SPC22]";
5D 191 POKE198,0:WAIT198,1:GETA$
44 192 IFA$="T"ANDDV=8THENPRINT"[HOME,DOWN,RIGHT14,RVSON]TAPE":DV=1
C0 193 IFA$="D"ANDDV=1THENPRINT"[HOME,DOWN,RIGHT14,RVSON]DISK":DV=8
31 194 IFA$=CHR$(13)THENRETURN
3D 195 IFA$=CHR$(32)THENRETURN
78 196 GOTO191
6A 197 PRINT"[HOME,DOWN2,SPC40]";:RETURN
CE 198 CH=0:A=KB-8:FORX=1TO8
5E 199 CH=CH+(X*(PEEK((PC-1)+X))):NEXT
F1 200 CH=CH+(LN*8)
B8 201 DE=CH:GOSUB113:CC$=MID$(HH$,3):LN=LN+1:RETURN
DD 202 PRINT"[HOME,BLACK,RVSOFF,C@40]";
52 203 PRINT"[RVSON]INPUT ERROR - RE-ENTER [WHITE]L[BLACK]INE OR [WHITE]C[BLACK]HECKSUM";
57 204 PRINT"[RVSOFF,CT40]"
79 205 GOSUB252
77 206 GETA$:IFA$=""THEN206
2C 207 IFA$="L"THENEF=1
18 208 IFA$="C"THENEF=2
11 209 IFA$<>"C"ANDA$<>"L"THEN206
B6 210 PRINT"[HOME]";:FORX=1TO3:PRINT"[SPC40]";:NEXT
5D 211 RETURN
B8 212 I=49152
ED 213 PRINT"[CLR,DOWN10,RIGHT7]PLEASE WAIT ONE MOMENT...."
2C 214 PRINT"[HOME,DOWN11,RIGHT7,CT26]"
FD 215 READX:IFX=256THENRETURN
B4 216 POKE I,X:I=I+1:GOTO 215
61 217 DATA 32,44,247,173,60,3,133,255
BE 218 DATA 169,0,133,193,169,64,133,194
FE 219 DATA 56,173,63,3,237,61,3,170
47 220 DATA 173,64,3,237,62,3,168,24
28 221 DATA 138,101,193,133,174,152,101,194
1A 222 DATA 133,175,32,162,245,165,255,141
2E 223 DATA 60,3,96.32,183,247,169,0
CC 224 DATA 133,193,169,64,133,194,56,173
83 225 DATA 63,3,237,61,3,170,173,64
5C 226 DATA 3,237,62,3,168,24,138,101
5E 227 DATA 193,133,174,152,101,194,133,175
3A 228 DATA 32,124,246,96,169,96,133,185
5C 229 DATA 169,1,141,60,3,133,184,169
36 230 DATA 8,133,186,169,0,133,195,133
1C 231 DATA 147,169,65,133,187,169,3,133
4B 232 DATA 188,169,64,133,196,164,183,32
5E 233 DATA 175,245,32,213,243,165,186,32
F5 234 DATA 9,237,165,185,32,199,237,32
BD 235 DATA 19,238,141,61,3,32,19,238
9A 236 DATA 141,62,3,32,232,244,165,174
A4 237 DATA 141,63,3,56,165,175,233,64
33 238 DATA 141,64,3,24,173,61,3,109
92 239 DATA 63,3,141,63,3,173,62,3
C0 240 DATA 109,64,3,141,64,3,96,169
70 241 DATA 97,133,185,169,1,133,184,169
B5 242 DATA 8,133,186,169,65,133,187,169
ED 243 DATA 3,133,188,165,185,164,183,32
CD 244 DATA 213,243,32,143,246,165,186,32
46 245 DATA 12,237,165,185,32,185,237,169
FD 246 DATA 0,133,172,169,64,133,173,56
A4 247 DATA 173,63,3,237,61,3,133,174
22 248 DATA 173,64,3,237,62,3,133,175
4C 249 DATA 24,169,64,101,175,133,175,173,61,3
46 250 DATA 32,221,237,173,62,3,160,0
2D 251 DATA 32,33,246,96,256
7A 252 POKE 54296,15:POKE 54277,0:POKE 54278,200
B8 253 POKE 54273,40:POKE 54272,00:POKE 54276,17
91 254 FOR X=1 TO 300:NEXT:POKE 54276,0:POKE 54277,0:POKE 54278,0:RETURN
```

Suicide Run

A tight grip on the joystick and fast reactions are required to play this superb C64 game.

By D.W. Light

You have been unlucky enough to receive a Saint Clair C5.5 from Father Christmas.

Your quest in this fast action game is to collect as many batteries as possible while dodging the landmines, missiles and bomb craters that are out to make your task difficult.

Suicide Run is for the C64 computer and is controlled by a joystick in Port 2. Full instructions for control are included in the game.

Getting It In

Suicide Run requires five separate programs. Each of which must be typed in and saved to disk or tape individually. The programs SUICIDE RUN and S/R BASIC must be typed in using our Syntax Checker, see the Listings article for more information.

The rest of the programs must all be typed in using the Hex Data Entry II program.

If you are using cassette then the programs should be loaded in the following order.

1) SUICIDE RUN
2) M/CODE
3) SCREENS
4) MSP&CHR
5) S/R BASIC

To RUN the program you simply need to LOAD and RUN the program "SUICIDE RUN". YC

```
PROGRAM: S/R LOADER

E8  5 REM*** S/R LOADER  ** D.W.
    L ***
06  10 PRINTCHR$(147):POKE147,0:
    DV=PEEK(186)
57  20 SYS57812"M/CODE",DV,1:SYS
    62631
EF  30 SYS57812"SCREENS",DV,1:SY
    S62631
7B  40 SYS57812"MSP&CHR",DV,1:SY
    S62631
ED  50 IFDV=8THEN70:REM**DISC
9A  60 POKE631.131:POKE198,1:END
C5  70 PRINTCHR$(147)"LOAD"CHR$(
    34)"S/R BASIC"CHR$(34)",8"
7E  80 POKE631,19:POKE632,13:POK
```

```
    E633,82:POKE634,117:POKE635,
    13:POKE198,5:END
```

```
PROGRAM: M/CODE

C000 20 04 C0 60 78 A9 2D 8D :D9
C008 14 03 A9 C0 8D 15 03 A9 :B9
C010 01 8D 1A D0 A9 51 8D 12 :57
C018 D0 AD 11 D0 29 7F 8D 11 :DF
C020 D0 A9 FF 8D 19 D0 A9 00 :6F
C028 8D 0E DC 58 60 A6 A9 BD :10
C030 BF CC 8D 12 D0 AD 11 D0 :8B
C038 29 7F 8D 11 D0 A9 81 8D :3F
C040 19 D0 E0 00 D0 03 4C FF :C7
C048 C0 A6 A8 D0 0F 8E AF 02 :04
C050 8E AE 02 8E 15 D0 8E 04 :C3
C058 D4 4C 11 C1 A5 02 8D 16 :CB
C060 D0 29 07 D0 03 4C 11 C1 :2D
C068 20 E4 FF C9 85 90 2C D0 :1E
C070 07 A9 00 8D B0 02 F0 23 :21
C078 C9 88 D0 08 A9 01 8D A7 :47
C080 02 4C 5A C1 C9 86 D0 07 :25
C088 A9 01 8D B0 02 D0 0C C9 :20
C090 87 D0 08 A9 00 8D A7 02 :62
C098 4C 5A C1 AE B2 02 F0 03 :C1
C0A0 4C 5A C1 AD A7 02 D0 03 :AE
C0A8 4C 5A C1 C6 02 20 00 40 :CD
C0B0 A5 0A F0 06 20 74 C4 4C :65
C0B8 C7 C0 AD 08 D0 85 F9 AD :8B
C0C0 09 D0 85 FA 20 E9 C3 20 :4B
C0C8 C0 C4 AD 04 D0 85 F9 AD :8C
C0D0 05 D0 85 FA 20 E9 C3 AD :BF
C0D8 0E D0 85 F9 AD 0F D0 85 :8C
C0E0 FA 20 E9 C3 C6 B5 D0 0C :0D
C0E8 AD F8 07 49 01 8D F8 07 :11
C0F0 A9 02 85 B5 AD AC 02 F0 :F7
C0F8 61 20 D6 C1 4C 5A C1 A5 :26
C100 A7 8D 16 D0 E6 A9 AD A8 :B2
C108 02 F0 03 4C 61 C1 4C 31 :2A
C110 EA A9 A0 85 FB A9 04 85 :61
C118 FC A2 0F A0 01 B1 FB 88 :4D
C120 91 FB C8 C8 C0 28 D0 F5 :27
C128 B1 FD 88 91 FB A5 FB 69 :99
C130 27 85 FB 90 03 E6 FC 18 :A9
C138 E6 FD D0 02 E6 FE CA 10 :08
C140 DA C6 AA D0 11 A9 D8 85 :3F
C148 FD A9 63 85 FE A9 F0 85 :78
C150 AA 85 A8 8D AC 02 A9 17 :EF
C158 85 02 A9 00 85 A9 4C 31 :07
C160 EA AD A7 02 D0 03 4C 31 :5F
C168 EA AD 00 DC 85 FF 29 04 :EE
C170 D0 0A AD 00 D0 C9 50 90 :D1
C178 03 CE 00 D0 A5 FF 29 08 :E9
C180 D0 0A AD 00 D0 C9 FA B0 :87
C188 03 EE 00 D0 A5 9B F0 0E :82
C190 A5 FF 29 01 F0 03 4C 23 :A0
C198 C5 85 9B 4C 23 C5 A5 9C :18
C1A0 F0 0C CE 01 D0 C6 BD D0 :75
C1A8 02 C6 9C 4C 23 C5 EE 01 :11
C1B0 D0 E6 BD A5 BD C9 14 F0 :8A
C1B8 03 4C 23 C5 A9 01 85 9B :9E
C1C0 85 9C 4C 23 C5 A9 20 A2 :AC
C1C8 00 9D C8 04 9D C8 05 9D :36
C1D0 20 06 E8 D0 F4 60 EE 22 :8A
C1D8 D0 AD 22 D0 29 0F D0 05 :A7
C1E0 A9 02 8D 22 D0 18 AD E5 :3F
C1E8 02 69 02 C9 10 D0 02 A9 :6C
C1F0 0A A2 00 8D E5 02 9D A0 :42
C1F8 D8 9D A0 D9 9D 1F DA E8 :4F
C200 D0 F4 8E AC 02 60 A9 93 :93
C208 20 D2 FF EA A9 06 8D 22 :CD
C210 D0 A9 05 85 0A A9 C0 8D :25
C218 E2 02 A9 40 8D D7 02 A9 :1A
C220 02 8D 20 D0 85 0A 8D DC :6C
C228 02 8D E3 02 85 B5 A9 01 :73
C230 8D A7 02 8D A8 02 85 A8 :7C
C238 8D DD 02 85 A9 85 9B 85 :69
C240 9C 8D B0 02 8D E0 02 8D :85
C248 E1 02 A9 63 85 FE A9 D8 :A0
C250 85 FD A9 F0 85 AA A9 07 :F6
C258 8D 23 D0 AD 16 D0 09 10 :5C
C260 29 17 85 02 8D 16 D0 85 :68
C268 A7 A0 18 A9 00 99 00 D4 :71
C270 88 10 FA 8D 1B D0 8D B2 :0C
C278 02 8D 21 D0 8D AE 02 8D :82
C280 AF 02 8D 15 D0 8D 10 D0 :7C
C288 8D B3 02 8D B4 02 8D C2 :30
C290 02 8D C1 02 8D BE 02 8D :A2
C298 BD 02 8D C0 02 8D BC 02 :8C
C2A0 8D E6 02 8D B5 02 8D BA :73
C2A8 02 8D B1 02 8D BB 02 8D :78
C2B0 B9 02 8D BF 02 8D C7 02 :E9
C2B8 8D C8 02 8D D8 02 8D C9 :76
C2C0 02 8D DE 02 8D B8 02 8D :05
C2C8 B6 02 8D C6 02 8D E4 02 :E5
C2D0 8D B7 02 8D C3 02 8D C4 :D8
C2D8 02 8D C5 02 8D DF 02 A9 :9C
C2E0 0F 8D 18 D4 A9 14 85 BD :F1
C2E8 A9 11 8D AD 02 A9 0B A9 :A3
C2F0 0A 8D 05 D4 A9 21 3D 06 :91
C2F8 D4 A2 C8 A0 A0 A9 02 9D :F4
C300 1F DB 98 9D 1F 07 CA D0 :DC
C308 F4 A9 00 85 FF A0 06 A2 :57
C310 16 18 20 F0 FF A6 FF BD :36
C318 A3 CC 20 D2 FF E6 FF C8 :93
C320 C0 22 D0 EB 60 18 A2 02 :2E
C328 AD E6 02 D0 25 20 EF C1 :F1
C330 A9 00 8D 0E D0 A9 18 8D :CE
C338 00 D0 8D 01 D0 8D 0F D0 :CA
C340 A9 C7 8D F8 07 A9 C5 8D :E2
C348 FF 07 A9 81 8D 15 D0 8D :AB
C350 E6 02 AD 12 D0 D0 FB 8A :A6
C358 6D 0E D0 8D 0E D0 8A 6D :D9
C360 0F D0 8D 0F D0 8A 6D 00 :39
C368 D0 8D 00 D0 8A 6D 01 D0 :59
C370 8D 01 D0 8D 08 D4 85 FF :5E
C378 46 FF A9 F0 38 E5 FF 8D :4E
C380 01 D4 A9 FF ED 01 D0 8D :DF
C388 0F D4 CE DC 02 D0 0D AD :C6
C390 15 D0 49 80 8D 15 D0 A9 :57
C398 02 8D DC 02 60 A2 00 BD :E4
C3A0 00 73 9D A0 04 BD 00 74 :FF
C3A8 9D A0 05 E8 D0 F1 A2 7F :50
C3B0 BD 00 75 9D A0 06 CA 10 :8A
C3B8 F7 60 AD 12 D0 D0 FB EE :FB
C3C0 0B D0 EE 01 D0 38 A9 A0 :38
C3C8 ED 0B D0 8D 0F D4 60 AD :BA
C3D0 12 D0 D0 FB 38 AD 0A D0 :CA
C3D8 E9 02 8D 0A D0 AD 0B D0 :7F
C3E0 E9 02 8D 0B D0 8D 0F D4 :07
```

```
C3E8 60 38 AD 01 D0 E9 08 C5 :A9
C3F0 FA B0 18 69 0C C5 FA 90 :66
C3F8 12 AD 00 D0 69 03 C5 F9 :EE
C400 90 09 E9 16 C5 F9 B0 03 :4C
C408 4C 11 C4 60 A9 00 8D DD :52
C410 02 A9 01 8D 15 D0 A9 03 :9B
C418 85 0A A9 00 8D DF 02 8D :1D
C420 C3 02 8D C5 02 8D C4 02 :66
C428 8D A8 02 8D B3 02 8D B4 :45
C430 02 8D B5 02 8D BB 02 8D :0C
C438 B6 02 8D B8 02 8D B9 02 :F0
C440 8D BC 02 8D BD 02 8D BE :07
C448 02 8D BF 02 8D C0 02 8D :60
C450 C1 02 8D C2 02 8D E4 02 :68
C458 8D C6 02 8D C7 02 8D C8 :B5
C460 02 8D C9 02 8D DE 02 8D :4A
C468 BA 02 8D B1 02 8D D8 02 :E1
C470 8D 10 D0 60 AD A8 02 F0 :EC
C478 46 38 AD 01 D0 E9 0A CD :6D
C480 09 D0 B0 3B AD 00 D0 69 :7E
C488 10 CD 08 D0 90 31 E9 20 :DF
C490 CD 08 D0 B0 2A 8D B7 02 :CE
C498 8D BB 02 AD 15 D0 29 EF :35
C4A0 8D 15 D0 A9 00 8D 09 D0 :78
C4A8 8D 12 D4 A9 0A 8D 13 D4 :1E
C4B0 A9 06 8D 14 D4 A9 11 8D :55
C4B8 12 D4 A9 96 8D 0F D4 60 :AC
C4C0 A9 00 85 FA 85 F7 8D AA :6E
C4C8 02 A9 04 85 F8 AD 00 D0 :A2
C4D0 4A 4A 4A 38 E9 03 65 F7 :86
C4D8 85 F7 AD 01 D0 4A 4A 4A :78
C4E0 38 E9 06 8D AB 02 85 F9 :FE
C4E8 A0 05 06 F9 26 FA 88 D0 :5A
C4F0 F9 18 A5 F7 65 F9 85 F7 :0E
C4F8 A5 F8 65 FA 85 F8 AD AA :18
C500 02 D0 11 EE AA 02 AD AB :FE
C508 02 85 F9 A9 00 85 FA A0 :97
C510 03 4C EA C4 A0 78 A9 7B :E0
C518 D1 F7 D0 06 8D DD 02 4C :BC
C520 0C C4 60 A5 0A D0 03 4C :EF
C528 49 C9 AD B5 02 F0 03 4C :FD
C530 1D C6 AD B4 02 F0 03 4C :CF
C538 C9 C5 AD B3 02 D0 3B A9 :2D
C540 00 8D 0D D4 8D 06 D0 A9 :AE
C548 3A 8D 07 D0 AD 10 D0 29 :AA
C550 F7 8D 10 D0 A9 08 8D 0C :89
C558 D4 8D 2A D0 0D 15 D0 8D :DB
C560 15 D0 A9 01 8D 08 D4 A9 :19
C568 20 8D 0B D4 8D D9 02 A9 :40
C570 DB 8D FB 07 8D B3 02 4C :D3
C578 AB C6 CE E0 02 10 18 AD :13
C580 FB 07 49 07 8D FB 07 AD :BC
C588 D9 02 49 01 8D D9 02 8D :91
C590 0B D4 A9 01 8D E0 02 EE :C1
C598 06 D0 F0 03 4C AB C6 AD :6A
C5A0 10 D0 09 08 8D 10 D0 8D :C4
C5A8 B4 02 A9 02 8D 2B D0 A9 :1E
C5B0 F8 8D 08 D0 A9 3A 8D 09 :E6
C5B8 D0 A9 CB 8D FC 07 AD 15 :E8
C5C0 D0 09 10 8D 15 D0 4C AB :BB
C5C8 C6 CE E0 02 10 20 AD FB :75
C5D0 07 49 07 8D FB 07 AD 2B :D6
C5D8 D0 49 02 8D 2B D0 AD D9 :AE
C5E0 02 49 01 8D D9 02 8D 0B :27
C5E8 D4 A9 01 8D E0 02 EE 06 :63
C5F0 D0 AD 09 D0 C9 60 B0 08 :B2
C5F8 69 02 8D 09 D0 4C AB C6 :E5
C600 A9 F6 8D 0A D0 A9 52 8D :10
C608 0B D0 A9 CC 8D FD 07 AD :26
C610 15 D0 09 20 8D 15 D0 8D :B7
C618 B5 02 4C AB C6 AD BB 02 :7A
C620 D0 48 AD 06 D0 C9 64 B0 :A1
C628 28 EE 06 D0 CE E0 02 10 :52
C630 20 AD FB 07 49 07 8D FB :01
C638 07 AD 2B D0 49 02 8D 2B :06
C640 D0 AD D9 02 49 01 8D D9 :13
C648 02 8D 0B D4 A9 01 8D E0 :03
C650 02 EE 09 D0 EE 0B D0 CE :91
C658 08 D0 CE 0A D0 AD 09 D0 :6F
C660 C9 B8 90 03 8D BB 02 4C :E6
C668 AB C6 CE E0 02 10 0D AD :B6
C670 2B D0 49 02 8D 2B D0 A9 :D9
C678 01 8D E0 02 CE 0B D0 AD :9B
C680 0A D0 E9 02 8D 0A D0 C9 :E2
C688 08 B0 08 AD 15 D0 29 DF :1C
C690 8D 15 D0 CE 08 D0 F0 03 :9F
C698 4C AB C6 A9 00 8D B4 02 :7A
C6A0 8D B3 02 8D BB 02 8D B5 :03
C6A8 02 C6 0A AD DE 02 F0 03 :12
C6B0 4C 42 C8 AD BC 02 F0 03 :EC
C6B8 4C 73 C7 AD BE 02 F0 03 :5D
C6C0 4C 4A C7 AD C2 02 D0 2A :7F
C6C8 A9 00 8D 02 D0 A9 70 8D :9E
C6D0 03 D0 AD 10 D0 29 F9 8D :F7
C6D8 10 D0 A9 D1 8D F9 07 A9 :D7
C6E0 01 8D 28 D0 AD 15 D0 09 :8A
C6E8 02 8D 15 D0 8D C2 02 4C :3E
C6F0 32 CA AD BD 02 D0 15 AD :96
C6F8 02 D0 69 02 8D 02 D0 C9 :A2
C700 50 90 03 8D BD 02 EE 03 :04
C708 D0 4C 32 CA AD 03 D0 8D :B9
C710 05 D0 AD 02 D0 8D 04 D0 :BE
C718 A9 D2 8D F9 07 A9 D4 8D :3D
C720 FA 07 A9 80 8D 12 D4 A9 :64
C728 B1 8D 13 D4 A9 00 8D 14 :44
C730 D4 8D E4 02 8D 0F D4 A9 :01
C738 81 8D 12 D4 AD 15 D0 09 :30
C740 04 8D 15 D0 8D BE 02 4C :80
C748 32 CA AD 04 D0 69 04 90 :47
C750 0D AA AD 10 D0 09 04 8D :C2
C758 10 D0 8D BC 02 8A 8D 04 :E0
C760 D0 EE 05 D0 18 AD 02 D0 :6F
C768 69 03 8D 02 D0 8D 0F D4 :ED
C770 4C 32 CA AD BF 02 D0 75 :51
C778 AD FA 07 C9 D4 D0 08 AD :F6
C780 04 D0 69 04 8D 04 D0 18 :B8
C788 AD 02 D0 69 03 8D 02 D0 :38
C790 AD 05 D0 C9 BA 90 50 CE :7D
C798 E3 02 D0 4E AD E4 02 D0 :6E
C7A0 1C A9 80 8D 12 D4 A9 0A :03
C7A8 8D 13 D4 A9 06 8D 14 D4 :13
C7B0 A9 81 8D 12 D4 A9 02 8D :DA
C7B8 0F D4 8D E4 02 A9 02 8D :1C
C7C0 E3 02 AD E2 02 EE E2 02 :12
C7C8 8D FA 07 C9 C4 D0 1B A9 :3B
C7D0 C0 8D E2 02 AD 15 D0 29 :2F
C7D8 FB 8D 15 D0 A9 7B 8D 1F :6E
C7E0 07 8D 1E 07 8D BF 02 EE :30
C7E8 05 D0 4C 32 CA AD C1 02 :90
C7F0 D0 23 18 AD 02 D0 69 03 :E3
C7F8 90 0D AA AD 10 D0 09 02 :D3
C800 8D 10 D0 8D C1 02 8A 8D :50
C808 02 D0 A9 D3 8D F9 07 CE :29
C810 03 D0 4C 32 CA 18 CE 03 :9B
C818 D0 AD 02 D0 69 03 8D 02 :92
C820 D0 C9 50 B0 03 4C 32 CA :B7
C828 8D DE 02 A9 00 8D BC 02 :9D
C830 8D BD 02 8D BE 02 8D BF :06
C838 02 8D C1 02 8D C2 02 4C :5A
C840 32 CA AD C7 02 F0 03 4C :48
C848 B6 C8 AD C8 02 D0 15 A9 :7A
C850 78 8D 03 D0 A9 CD 8D F9 :E9
C858 07 A9 0A 8D 28 D0 8D C8 :C6
C860 02 4C 32 CA EE 03 D0 38 :E0
C868 AD 02 D0 E9 03 B0 41 AA :73
C870 AD 10 D0 29 F9 8D 10 D0 :6C
C878 A9 FF 8D 04 D0 AD 03 D0 :89
C880 8D 05 D0 A9 D0 8D FA 07 :97
C888 A9 CE 8D F9 07 A9 80 8D :59
C890 12 D4 A9 B1 8D 13 D4 A9 :50
C898 00 8D 14 D4 8D E4 02 A9 :AD
C8A0 81 8D 12 D4 AD 15 D0 09 :98
C8A8 04 8D 15 D0 8D C7 02 8A :0E
C8B0 8D 02 D0 4C 32 CA AD C7 :9A
C8B8 02 D0 6C 38 AD 02 D0 E9 :E3
C8C0 04 8D 02 D0 AD 04 D0 E9 :95
C8C8 05 8D 04 D0 8D 0F D4 AD :82
C8D0 05 D0 C9 BA B0 06 EE 05 :F6
C8D8 D0 4C 32 CA AD E4 02 D0 :45
C8E0 17 A9 80 8D 12 D4 A9 0A :3E
C8E8 8D 13 D4 A9 06 8D 14 D4 :53
C8F0 A9 81 8D 12 D4 8D E4 02 :48
C8F8 CE E3 02 D0 27 A9 02 8D :01
C900 E3 02 AD E2 02 EE E2 02 :52
C908 8D FA 07 C9 C4 D0 15 A9 :51
C910 C0 8D E2 02 8D C9 02 AD :85
C918 15 D0 29 FB 8D 15 D0 A9 :6B
C920 CF 8D F9 07 4C 32 CA 38 :FE
C928 AD 02 D0 E9 04 B0 11 A9 :E0
C930 00 8D C7 02 8D C8 02 8D :8E
C938 C9 02 8D DE 02 4C 32 CA :A4
C940 8D 02 D0 CE 03 D0 4C 32 :0C
C948 CA AD B1 02 F0 03 4C EA :AD
C950 C9 AD BA 02 D0 35 A9 00 :96
C958 8D 0D D4 8D D8 02 8D 07 :06
C960 D0 AD 10 D0 29 F7 8D 10 :EC
C968 D0 A9 D9 8D FB 07 A9 C5 :21
C970 8D FC 07 A9 0F 8D 0C D4 :3B
C978 AD 15 D0 09 08 8D 15 D0 :6C
C980 A9 02 8D 2A D0 8D BA 02 :00
C988 4C AB C6 AD 00 D0 8D 06 :1B
C990 D0 CE E0 02 D0 32 AD FB :73
C998 07 49 03 8D FB 07 AD 2A :8A
C9A0 D0 49 04 8D 2A D0 A9 02 :A3
C9A8 8D E0 02 AD D9 02 49 A1 :FF
C9B0 8D D9 02 8D 0B D4 18 A9 :48
C9B8 01 6D 07 D0 CD D7 02 B0 :81
C9C0 0A 8D 07 D0 4A 8D 08 D4 :D1
C9C8 4C AB C6 CE D8 02 D0 F8 :A8
C9D0 8D 09 D0 AD 06 D0 8D 08 :AC
C9D8 D0 A9 10 8D 0B D4 0D 15 :90
C9E0 D0 8D 15 D0 8D B1 02 4C :9E
C9E8 AB C6 CE E0 02 D0 20 38 :93
C9F0 AD 07 D0 E9 01 90 0B 8D :D9
C9F8 07 D0 AD FB 07 49 03 8D :E8
CA00 FB 07 AD 2B D0 49 01 8D :F1
CA08 2B D0 A9 02 8D E0 02 AD :4D
CA10 09 D0 69 02 C9 B6 B0 06 :2D
CA18 8D 09 D0 4C AB C6 CE 08 :34
CA20 D0 D0 0C A9 00 8D B1 02 :8D
CA28 8D BA 02 A9 03 85 0A 4C :A6
CA30 AB C6 AD DF 02 D0 03 4C :49
CA38 4F CB AD B6 02 F0 03 4C :1B
CA40 DB CA AD C0 02 D0 4F AD :31
CA48 B8 02 D0 22 A9 00 8D 0C :84
CA50 D0 A9 38 8D 0D D0 A9 0D :76
CA58 8D 2D D0 A9 DD 8D FE 07 :1C
CA60 AD 15 D0 09 40 8D 15 D0 :8C
CA68 8D B8 02 4C 31 EA CE E1 :B6
CA70 02 10 0D AD FE 07 49 03 :A4
CA78 8D FE 07 A9 01 8D E1 02 :44
CA80 EE 0D D0 18 AD 0C D0 69 :F9
CA88 02 8D 0C D0 C9 64 90 03 :55
CA90 EE C0 02 4C 31 EA 18 AD :B5
CA98 0C D0 69 02 90 25 AA AD :43
CAA0 10 D0 09 40 8D 10 D0 A9 :B4
CAA8 FF 8D 0E D0 AD 0D D0 8D :F2
CAB0 0F D0 A9 D7 8D FF 07 AD :0A
CAB8 15 D0 09 80 8D 15 D0 8D :DF
CAC0 B6 02 8A 8D 0C D0 CE E1 :12
CAC8 02 10 0D AD FE 07 49 03 :FC
CAD0 8D FE 07 A9 01 8D E1 02 :9C
CAD8 4C 31 EA AD B9 02 D0 35 :F9
CAE0 CE E1 02 10 15 AD FE 07 :57
CAE8 49 03 8D FE 07 AD 2E D0 :C9
CAF0 49 01 8D 2E D0 A9 01 8D :0A
CAF8 E1 02 18 AD 0C D0 69 02 :E4
CB00 8D 0C D0 AD 0F D0 69 03 :EB
CB08 C9 B4 90 03 EE B9 02 8D :67
CB10 0F D0 4C 31 EA CE E1 02 :04
CB18 10 0D AD 2E D0 49 01 8D :36
CB20 2E D0 A9 01 8D E1 02 AD :6A
CB28 0C D0 69 02 C9 52 B0 03 :D8
CB30 8D 0C D0 CE 0E D0 F0 03 :4B
CB38 4C 31 EA A9 00 8D DF 02 :BF
CB40 8D B6 02 8D B9 02 8D B8 :B7
CB48 02 8D C0 02 4C 31 EA AD :1C
CB50 C3 02 F0 03 4C F5 CB AD :22
CB58 C4 02 D0 68 AD C5 02 D0 :BD
CB60 30 AD 10 D0 09 40 8D 10 :62
CB68 D0 A9 50 8D 0C D0 8D 0D :0D
CB70 D0 A9 D8 8D FE 07 A9 05 :35
CB78 8D 2D D0 AD 15 D0 09 40 :08
CB80 8D 15 D0 A9 01 8D 2E D0 :60
CB88 8D E1 02 8D C5 02 4C 31 :92
CB90 EA 38 AD 0C D0 E9 04 B0 :43
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CB98 25 AA AD 10 D0 29 BF 8D :FF
CBA0 10 D0 A9 FF 8D 0E D0 AD :74
CBA8 0D D0 8D 0F D0 AD 15 D0 :69
CBB0 09 80 8D 15 D0 A9 D7 8D :03
CBB8 FF 07 8D C4 02 BA 8D 0C :FD
CBC0 D0 4C 31 EA 38 AD 0C D0 :5D
CBC8 E9 04 8D 0C D0 CE E1 02 :AB
CBD0 10 0D AD 2E D0 49 01 8D :EE
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PROGRAM: SCREENS

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PROGRAM: MSP&CHR

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3028 0E 00 00 1E 40 00 02 00 :FC
3030 00 0D 00 00 00 00 00 00 :4A
3038 00 00 00 00 00 00 00 FF :30
3040 00 1C 00 00 42 00 00 49 :0A
3048 40 0A 31 20 00 DB 30 0A :5F
3050 14 4A 0D 00 20 00 81 00 :46
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3060 20 03 49 10 00 22 32 04 :EB
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3070 03 20 44 02 4D 10 00 02 :78
3078 30 00 18 00 00 50 00 FF :C8
3080 00 00 00 00 00 08 40 00 :70
3088 00 01 04 00 00 00 80 00 :16
3090 04 00 04 80 00 08 08 70 :88
3098 02 25 00 08 A8 80 02 AA :AA
30A0 04 22 A8 20 00 A0 40 08 :20
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30B0 01 90 20 00 40 00 00 18 :31
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30C0 00 00 00 00 00 04 00 20 :D8
30C8 02 00 00 48 C2 0A 00 00 :F0
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30D8 01 20 20 05 0A 41 80 3C :A5
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30F8 00 40 00 00 80 00 02 FF :FE
3100 00 00 00 02 00 10 00 08 :A8
3108 00 00 00 00 00 80 02 00 :16
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3138 00 04 10 80 00 00 04 FF :B4
3140 00 00 00 00 00 00 00 00 :40
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3160 00 00 00 00 00 00 00 00 :60
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31B8 00 00 00 00 00 00 00 5F :B0
31C0 00 00 00 00 00 00 00 00 :C0
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31E8 70 57 01 5D 01 08 54 54 :9E
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31F8 2E 08 00 2A 00 00 08 FF :0E
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3218 0F C0 00 5B 84 00 9A B5 :05
3220 00 92 81 40 D2 00 5A D7 :0F
3228 E8 1A 97 ED 55 95 55 41 :3F
3230 52 00 08 0A 95 6A 0B 80 :74
3238 2E 0A 80 2A 02 00 08 FF :DC
3240 00 00 00 00 00 00 00 00 :40
3248 00 00 00 00 00 00 00 00 :48
3250 00 00 03 00 00 0F C0 00 :F3
3258 0F C0 00 1B 84 00 DA B5 :05
3260 00 D2 81 40 92 00 58 97 :81
3268 E8 1A D7 ED 55 D5 55 41 :BF
3270 52 00 08 0A 95 6A 0A 80 :AD
3278 2A 0A 80 2A 02 00 08 FF :18
3280 00 00 00 00 00 00 00 7E :70
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32A8 A5 20 02 4A 40 01 52 80 :3F
32B0 01 24 80 00 91 00 00 4A :9E
32B8 00 00 24 00 00 24 00 FF :F4
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32F0 2E FE E0 2E FE E0 2E AA :3A
32F8 E0 2F FF E0 0A AA 80 FF :59
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3318 02 AA A0 01 55 40 00 AA :CB
3320 80 00 55 00 00 2A 00 00 :9B
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3330 00 00 00 00 00 00 00 00 :30
3338 00 00 00 00 00 00 00 FF :30
3340 00 00 0C 00 00 6C 00 80 :EC
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3360 80 03 F7 C0 04 2D 60 08 :CD
3368 5E F0 08 BD 78 0F 7F FC :BD
3370 0F BF F8 1D C0 10 17 80 :1A
3378 20 1E 00 40 20 00 00 FF :6C
3380 00 00 00 00 00 00 00 00 :80
3388 00 00 00 01 00 00 03 00 :A1
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33A0 BF F6 00 E1 1D FF 6E 06 :8C
33A8 FD 87 00 3A C3 00 0D E1 :CD
33B0 00 00 70 00 03 F8 00 00 :DF
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33C0 00 00 00 80 00 00 7F 81 :41
33C8 00 28 40 B0 3C 40 40 1E :34
33D0 5F E0 01 ED 70 0E F6 E0 :E4
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33F0 4F C1 6C 2F 81 BB 1F 01 :77
33F8 D0 0E 01 C0 04 00 80 FF :73
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3418 00 00 00 00 00 00 00 00 :18
3420 00 00 00 00 00 00 00 00 :20
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3448 00 0C 03 80 F6 07 C0 F7 :59
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3458 03 77 80 02 BB 80 01 DC :5F
3460 00 03 EF C0 06 B4 20 0F :E1
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3470 1F FD F0 08 03 B8 04 01 :FC
3478 E8 02 00 78 00 00 04 FF :58
3480 00 00 00 00 00 00 00 00 :80
3488 00 80 00 00 C0 00 00 C0 :48
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35F8 A8 00 2F FE 00 0A A8 FF :F4
3600 00 0F 80 00 01 80 00 07 :D8
3608 80 00 0F 80 00 1B 81 00 :DE
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3618 3F 80 10 61 FF FE CC FF :86
3620 C1 61 FF FE 3F 80 10 0E :B3
3628 7F 8E 00 7B 87 00 35 83 :DD
3630 00 1B 81 00 0F 80 00 07 :6C
3638 80 00 01 80 00 0F 80 FF :8D
3640 AF E0 00 00 20 00 00 30 :CF
3648 00 00 10 00 00 30 07 00 :C9
3650 20 01 00 F0 03 01 08 07 :B7
3658 02 2C 0F 04 6E 19 08 6B :3B
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3670 04 08 14 44 08 1F 44 08 :CE
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3688 00 00 40 00 00 60 07 00 :B9
3690 20 01 00 F0 03 01 08 07 :F7
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36F8 80 00 07 80 00 03 00 FF :97
3700 00 00 00 C0 00 00 E0 00 :20
3708 00 A0 00 00 A0 1F 00 A0 :22
3710 29 80 B0 69 40 B8 E9 20 :DC
3718 FF FF F0 FD FF CE 8A C0 :6E
3720 3F FD BF D2 7F C0 3E 1F :83
3728 FF DE 08 1F E0 0C 07 81 :58
3730 00 03 01 00 03 01 00 04 :6E
3738 81 00 07 81 00 03 00 FF :DC
3740 00 00 00 AA A8 00 80 04 :D0
3748 00 C0 04 00 C0 0F 00 E0 :EE
3750 10 82 F0 26 40 18 6F 20 :A5
3758 FF E6 30 F9 FF FC FE FF :64
3760 FD C7 80 1F BB 7F EC 77 :B4
3768 B5 D8 60 3B 80 00 35 00 :CC
3770 00 3F C2 00 3C 00 00 38 :20
3778 00 00 30 00 00 00 00 F7 :C0
3780 00 00 00 AA A8 00 80 04 :10
3788 02 C0 04 02 C0 0F 02 E0 :46
3790 10 82 F0 26 42 18 6F 20 :EF
3798 FF E6 30 F9 FF FC FE FF :A4
37A0 FF C7 80 1D BB 7F EC 77 :EE
37A8 B5 D8 60 3B 82 00 35 02 :26
37B0 00 3F C2 00 3C 02 00 38 :6C
37B8 02 00 30 02 00 00 00 FF :4A
37C0 33 00 D1 37 10 22 53 54 :43
37C8 41 20 56 49 43 AA 32 31 :A0
37D0 00 E5 37 1A 22 50 41 52 :88
37D8 41 35 20 44 45 43 20 56 :6E
37E0 49 43 AA 38 00 F4 37 24 :E6
37E8 22 42 45 51 20 52 45 53 :A8
37F0 45 54 31 00 03 38 2E 22 :21
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3808 3E 7F 63 63 7F E7 E7 00 :2F
3810 7F 63 63 6E 6E 63 7F 00 :27
3818 3F 73 73 60 60 63 3F 00 :01
3820 7E 7F 63 63 73 73 7E 00 :B4
3828 7F 67 60 70 7E 60 7F 00 :84
3830 7F 6F 60 7C 7C 60 70 00 :59
3838 3F 63 60 6F 67 63 7F 00 :E7
3840 73 73 63 7F 7F 63 67 00 :5C
3848 7F 18 18 18 1C 1C 7F 00 :4C
3850 7F 6F 0C 0C 0C 0E 7F 00 :0A
3858 66 6E 78 78 78 7F 67 00 :05
3860 70 70 70 70 60 63 7F 00 :6B
3868 77 7F 6B 63 63 67 67 00 :D4
3870 67 73 7B 6F 67 63 67 00 :10
3878 3E 67 67 63 63 73 3E 00 :98
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3888 3E 7E 6E 6E 66 67 7F 00 :A5
3890 7F 63 67 7F 7C 66 73 00 :FB
3898 7F 63 60 7F 03 63 7F 00 :D3
38A0 7F 5B 18 18 18 38 38 00 :CD
38A8 66 66 66 66 67 67 3F 00 :CA
38B0 63 63 63 63 67 67 1C 00 :BF
38B8 73 73 63 63 6B 7F 36 00 :51
38C0 63 63 36 3C 3C 36 63 00 :A0
38C8 63 63 36 18 18 1C 1C 00 :D7
38D0 7F 7F 66 0C 18 73 7F 00 :52
38D8 3C 30 30 30 30 30 3C 00 :78
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38F8 00 10 30 7F 7F 30 10 00 :AF
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3918 66 66 FF 66 FF 66 66 00 :08
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3928 62 66 0C 18 30 66 46 00 :18
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3978 00 03 06 0C 18 30 60 00 :F8
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3998 7F 63 07 7F 07 63 7F 00 :DC
39A0 70 70 70 66 66 7F 06 00 :FA
39A8 7F 77 70 7F 03 63 7F 00 :3B
39B0 7F 67 60 7F 73 73 7F 00 :83
39B8 7F 63 07 1F 0C 0C 0C 00 :66
39C0 7F 73 63 7F 63 67 7F 00 :1C
39C8 7F 63 63 7F 03 73 7F 00 :6C
39D0 00 00 00 00 00 10 14 10 :3C
39D8 3C FF AE 5B FF FB BD FF :88
39E0 00 00 03 0E 0F 0B 0E 03 :28
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3A20 FF FE FC F0 00 00 00 00 :CF
3A28 00 00 00 00 03 0F 3F EB :A2
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3AC0 00 00 01 0A 04 08 10 20 :9F
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3AF8 00 00 00 00 40 40 40 50 :F8
3B00 00 00 00 00 00 00 00 00 :00
3B08 05 05 06 06 16 16 16 55 :75
3B10 54 55 55 57 57 55 D5 D5 :95
3B18 D0 51 51 D5 D5 59 59 59 :47
3B20 40 40 40 50 D0 40 40 40 :30
3B28 54 54 60 60 50 14 14 05 :80
3B30 15 01 05 01 05 06 06 06 :F1
3B38 55 59 D9 D9 D9 D5 D5 55 :E4
3B40 50 50 54 65 67 55 55 51 :9C
3B48 05 05 01 01 01 01 01 00 :70
3B50 55 FD 55 55 45 41 41 41 :A0
3B58 55 55 95 BD 95 95 99 59 :68
3B60 50 D0 54 54 55 59 59 59 :92
3B68 01 01 00 00 00 00 00 00 :68
3B70 59 59 55 55 5F 55 55 55 :A2
3B78 55 5D 55 54 54 50 90 90 :CA
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3B88 F5 95 95 55 55 D9 59 5B :C0
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3B98 00 00 00 00 01 01 01 01 :B2
3BA0 01 01 01 05 05 06 46 56 :91
3BA8 59 29 25 25 25 25 F5 55 :48
3BB0 50 50 50 50 64 64 65 F5 :87
3BB8 05 06 06 06 15 18 19 55 :55
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3BC8 55 55 55 55 55 55 55 55 :BC
3BD0 00 7E 42 42 42 42 7E 00 :E2
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3BF8 F0 F0 F0 F0 0F 0F 0F 0F :DE
3C00 C3 99 91 91 9F 9D C3 FF :02
3C08 C1 80 9C 9C 80 18 18 FF :BD
3C10 80 9C 9C 91 91 9C 80 FF :D5
3C18 C0 8C 8C 9F 9F 9C C0 FF :0B
3C20 81 80 9C 9C 8C 8C 81 FF :68
3C28 80 98 9F 8F 81 9F 80 FF :AB
3C30 80 90 9F 83 83 9F 8F FF :E3
3C38 C0 9C 9F 90 98 9C 80 FF :65
3C40 8C 8C 9C 80 80 9C 98 FF :00
3C48 80 E7 E7 E7 E3 E3 80 FF :20
3C50 80 90 F3 F3 F3 F1 80 FF :72
3C58 99 91 87 87 87 80 98 FF :87
3C60 8F 8F 8F 8F 9F 9C 80 FF :31
3C68 88 80 94 9C 9C 98 98 FF :D8
3C70 98 8C 84 90 98 9C 98 FF :AC
3C78 C1 98 98 9C 9C 8C C1 FF :34
3C80 80 80 9C 9C 90 9F 8F FF :AF
3C88 C1 81 91 91 99 98 80 FF :47
3C90 80 9C 98 80 83 99 8C FF :01
3C98 80 9C 9F 80 FC 9C 80 FF :39
3CA0 80 A4 E7 E7 E7 C7 C7 FF :4F
3CA8 99 99 99 99 98 98 C0 FF :62
3CB0 9C 9C 9C 9C 98 98 E3 FF :7D
3CB8 8C 8C 9C 9C 94 80 C9 FF :FB
3CC0 9C 9C C9 C3 C3 C9 9C FF :BC
3CC8 9C 9C C9 E7 E7 E3 E3 FF :95
3CD0 80 80 99 F3 E7 8C 80 FF :2A
3CD8 C3 CF CF CF CF CF C3 FF :14
3CE0 F3 ED CF 83 CF 9D 03 FF :EC
3CE8 C3 F3 F3 F3 F3 F3 C3 FF :F4
3CF0 FF E7 C3 81 E7 E7 E7 E7 :80
3CF8 FF EF CF 80 80 CF EF FF :1D
3D00 FF FF FF FF FF FF FF FF :DC
3D08 E7 E7 E7 E7 FF FF E7 FF :4C
3D10 99 99 99 FF FF FF FF FF :88
3D18 99 99 00 99 00 99 99 FF :04
3D20 E7 C1 9F C3 F9 83 E7 FF :AA
3D28 9D 99 F3 E7 CF 99 B9 FF :14
3D30 C3 99 C3 C7 98 99 C0 FF :50
3D38 F9 F3 E7 FF FF FF FF FF :AE
3D40 F3 E7 CF CF CF E7 F3 FF :BC
3D48 CF E7 F3 F3 F3 E7 CF FF :54
3D50 FF 99 C3 00 C3 99 FF FF :20
3D58 FF E7 E7 81 E7 E7 FF FF :BC
3D60 FF FF FF FF FF E7 E7 CF :84
3D68 FF FF FF 81 FF FF FF FF :4C
3D70 FF FF FF FF FF E7 E7 FF :14
3D78 FF FC F9 F3 E7 CF 9F FF :D4
3D80 C1 98 90 84 8C 9C C1 FF :D4
3D88 E3 E3 C3 F3 F3 F1 C0 FF :E3
3D90 80 FC FC 80 9F 98 80 FF :1F
3D98 80 9C F8 80 F8 9C 80 FF :30
3DA0 8F 8F 8F 99 99 80 F9 FF :22
3DA8 80 88 8F 80 FC 9C 80 FF :F1
3DB0 80 98 9F 80 8C 8C 80 FF :B9
3DB8 80 9C F8 E0 F3 F3 F3 FF :E6
3DC0 80 8C 9C 80 9C 98 80 FF :40
3DC8 80 9C 9C 80 FC 8C 80 FF :00
3DD0 FF FF FF FF FF EF EB EF :40
3DD8 C3 00 51 A4 00 04 42 00 :04
3DE0 FF FF FC F1 F0 F4 F1 FC :74
3DE8 FF FF 3F 4F 0F 1F 4F 3F :04
3DF0 00 C3 D3 D3 CB CB C3 C3 :61
3DF8 FF FC F0 E5 C4 90 00 06 :B7
3E00 FF 3F 0F 03 2B 20 15 60 :E0
3E08 00 00 25 01 00 00 00 90 :FB
3E10 20 E0 C0 F0 FF FF FF FF :D6
3E18 00 00 16 00 00 E3 C3 C3 :19
3E20 00 01 03 0F FF FF FF FF :4D
3E28 FF FF FF FF FC F0 C0 14 :8A
3E30 C3 C7 C7 00 00 54 00 00 :CE
3E38 FF FF FF FF 3F 0F 03 50 :58
3E40 FC FC F0 C1 C0 01 00 00 :CE
3E48 14 82 42 00 00 55 00 00 :24
3E50 21 10 10 10 00 54 00 00 :F9
3E58 08 05 02 A1 00 00 0A 00 :3A
3E60 3F 3F 0F 4F 03 00 A0 00 :F5
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3E68 28 05 02 C0 C0 F0 FC FF :DC
3E70 00 00 80 00 A9 00 00 00 :3D
3E78 55 00 00 00 A0 00 00 00 :ED
3E80 54 00 00 1A 00 00 14 00 :C8
3E88 00 00 24 43 03 0F 3F FF :1A
3E90 00 D3 D3 D3 C3 C3 C3 C3 :C9
3E98 CB CB C3 C3 C3 28 28 00 :25
3EA0 00 C1 C2 C3 C3 C3 C3 00 :2A
3EA8 FF FF 7F AF EF DF FB F7 :58
3EB0 00 C3 C3 C3 C3 C3 C1 09 :7B
3EB8 F7 FB EF DF EF BF 7F FF :84
3EC0 FF FF FE F5 FB F7 EF DF :BD
3EC8 24 93 83 C3 C3 C3 C3 00 :5D
3ED0 DF EF FB F7 FA FD FF FF :1B
3ED8 00 C3 C3 C3 C3 83 43 00 :69
3EE0 BF BF AF AF 2B 2B AB AB :C4
3EE8 FE FE FE FE FE FA F9 F9 :3D
3EF0 AA AA 6B 6B 6A AA AA AA :CA
3EF8 FF FF FF FF BF BF BF AF :D4
3F00 FF FF FF FF FF FF FF FF :DC
3F08 FA FA F9 F9 E9 E9 E9 AA :77
3F10 AB AA AA AB AB AA 2A 2A :67
3F18 2F AE AE 2A 2A A6 A6 A6 :C5
3F20 BF BF BF AF 2F BF BF BF :EC
3F28 AB AB 9F 9F AF EB EB FA :AC
3F30 EA FE FA FE FA F9 F9 F9 :4B
3F38 AA A6 26 26 26 2A 2A AA :68
3F40 AF AF AB 9A 9B AA AA AE :C0
3F48 FA FA FE FE FE FE FE FF :FC
3F50 AA 02 AA AA BA BE BE BE :DC
3F58 AA AA 6A 42 6A 6A 66 A6 :24
3F60 AF 2F AB AB AA A6 A6 A6 :0A
3F68 FE FE FF FF FF FF FF FF :41
3F70 A6 A6 AA AA A0 AA AA AA :1A
3F78 AA A2 AA AB AB AF 6F 6F :02
3F80 FE FE FE FE FA FB FA FA :C4
3F88 0A 6A 6A AA AA 26 A6 A4 :2C
3F90 BF BF BF BF BF BF AF AF :7C
3F98 FF FF FF FF FE FE FE FE :5A
3FA0 FE FE FE FA FA F9 B9 A9 :8B
3FA8 A6 D6 DA DA DA DA 0A AA :E4
3FB0 AF AF AF AF 9B 9B 9A 0A :B5
3FB8 FA F9 F9 F9 EA E4 E6 AA :F7
3FC0 FF BF AF 6B 6A 66 L6 0A :86
3FC8 AA AA AA AA AA AA AA AA :B0
3FD0 FF 81 BD BD BD BD 81 FF :9A
3FD8 FF FF 3F 4C 91 A6 AA AA :71
3FE0 E0 F0 E7 C0 81 F3 E3 C3 :D9
3FE8 C3 C3 E4 81 27 C3 99 39 :2D
3FF0 7E AD F7 E7 53 2F 52 20 :40
3FF8 53 50 52 20 50 4F 4B 45 :00
4000 AD B0 02 D0 0C A9 00 8D :ED
4008 04 D4 8D AF 02 8D AE 02 :41
4010 60 AD AE 02 D0 33 AD AD :41
4018 02 8D 04 D4 AE AF 02 BD :06
4020 00 43 8D AE 02 BD 00 41 :85
4028 8D 01 D4 BD 00 42 8D 00 :8E
4030 D4 EE AF 02 AE AF 02 E0 :83
4038 CB D0 0E AD AD 02 49 30 :6D
4040 8D AD 02 A2 00 8E AF 02 :E2
4048 60 CE AE 02 AD AE 02 C9 :21
4050 03 10 09 38 AD AD 02 E9 :33
4058 01 8D 04 D4 60 50 33 58 :B4
4060 53 48 49 50 20 53 54 41 :4A
4068 20 56 49 43 AA 32 00 7C :79
4070 40 28 28 4C 44 41 20 23 :7A
4078 32 31 31 00 89 40 32 28 :6A
4080 53 54 41 20 32 30 34 31 :CC
4088 00 97 40 3C 28 44 45 43 :C1
4090 20 56 49 43 AA 33 00 A2 :D7
4098 40 46 28 4A 4D 50 20 42 :55
40A0 31 00 B1 40 50 28 50 33 :2C
40A8 58 53 45 54 20 43 4C 43 :23
40B0 00 BF 40 5A 28 44 45 43 :B1
40B8 20 56 49 43 AA 33 00 CD :57
40C0 40 64 28 4C 44 41 20 56 :DA
40C8 49 43 AA 32 00 DA 40 6E :A9
40D0 28 41 44 43 20 23 24 30 :40
40D8 33 00 E8 40 78 28 53 54 :F0
40E0 41 20 56 49 43 AA 32 00 :30
40E8 F5 40 82 28 43 4D 50 20 :D0
40F0 23 24 35 30 00 03 41 8C :F3
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40F8 28 42 43 53 20 50 33 4F :16
4100 1C 1F 21 2A 1C 1F 21 2A :E2
4108 1C 1F 21 2A 1C 1F 21 2A :EA
4110 1C 1F 21 2A 1C 1F 21 2A :F2
4118 1C 1F 21 2A 1C 15 15 16 :CA
4120 16 15 15 16 16 15 15 16 :26
4128 16 15 15 1C 1C 1A 25 25 :6A
4130 25 21 15 15 16 16 15 15 :57
4138 16 16 15 15 16 16 15 15 :3A
4140 1C 1C 1A 2C 2C 2C 2A 15 :44
4148 25 25 21 21 21 1F 1F 21 :DE
4150 1F 1C 25 25 21 21 21 1F :F4
4158 1F 21 1F 1C 1C 1C 1F 1F :8B
4160 1C 1C 1F 1F 1C 1C 1F 1F :92
4168 1C 1C 21 21 1F 15 16 12 :E6
4170 15 10 12 0F 15 16 12 15 :2A
4178 10 12 0F 10 1C 1F 21 1C :26
4180 1F 21 21 1C 1F 21 1F 1C :CE
4188 21 21 1C 1C 1C 1F 21 1C :BC
4190 1F 21 21 1C 1F 21 1F 1C :DE
4198 21 21 1C 1C 2C 32 2C 25 :23
41A0 2A 2C 2A 2C 2A 1C 25 21 :D5
41A8 1F 1C 1F 21 1C 1F 21 1F :05
41B0 1C 21 21 1C 2A 2A 2A 2A :25
41B8 15 1C 21 2A 27 27 27 27 :06
41C0 27 27 16 1C 21 2A 1F 1C :41
41C8 21 21 1C 41 18 29 21 00 :DB
41D0 D6 41 22 29 21 00 E9 41 :3E
41D8 2C 29 46 32 20 4C 44 41 :3C
41E0 20 46 32 58 46 4C 41 47 :A7
41E8 00 F9 41 36 29 42 45 51 :39
41F0 20 46 32 53 4B 49 50 30 :5B
41F8 00 05 42 40 29 4A 4D 50 :EC
4200 31 A5 87 3E 31 A5 87 3E :7C
4208 31 A5 87 3E 31 A5 87 3E :84
4210 31 A5 87 3E 31 A5 87 3E :8C
4218 31 A5 87 3E 31 1F 1F 60 :AB
4220 60 1F 1F 60 60 1F 1F 60 :0E
4228 60 1F 1F 31 31 9C A2 A2 :02
4230 A2 87 1F 1F 60 60 1F 1F :AA
4238 60 60 1F 1F 60 60 1F 1F :22
4240 31 31 9C C1 C1 C1 3E 1F :A0
4248 A2 A2 87 87 87 A5 A5 87 :1B
4250 A5 31 A2 A2 87 87 87 A5 :6B
4258 A5 87 A5 31 31 31 A5 A5 :84
4260 31 31 A5 A5 31 31 A5 A5 :3C
4268 31 31 87 87 A5 1F 60 D1 :C7
4270 1F C3 D1 D2 1F 60 D1 1F :5A
4278 C3 D1 D2 C3 31 A5 87 31 :6B
4280 A5 87 87 31 A5 87 A5 31 :FA
4288 87 87 31 31 31 A5 87 31 :80
4290 A5 87 87 31 A5 87 A5 31 :0A
4298 87 87 31 31 C1 3C C1 A2 :08
42A0 3E C1 3E C1 3E 31 A2 87 :20
42A8 A5 31 A5 87 31 A5 87 A5 :66
42B0 31 87 87 31 3E 3E 3E 3E :94
42B8 1F 31 87 3E DF DF DF DF :6C
42C0 DF DF 60 31 87 3E A5 31 :63
42C8 87 87 31 43 20 23 24 30 :EA
42D0 33 00 E1 42 D6 29 42 43 :B8
42D8 53 20 46 32 53 4B 49 50 :E5
42E0 00 E9 42 E0 29 54 41 58 :44
42E8 00 F8 42 EA 29 4C 44 41 :BF
42F0 20 56 49 43 AA 31 36 00 :95
42F8 03 43 F4 29 AF 20 23 32 :B1
4300 06 06 06 06 06 06 06 06 :D8
4308 06 06 06 06 06 06 06 06 :E0
4310 06 06 05 06 06 06 06 06 :E8
4318 06 06 05 05 0A 0A 0A 0A :58
4320 0A 0A 0A 0A 0A 0A 0A 0A :B8
4328 0A 0A 0A 0A 0A 14 0A 14 :1C
4330 0A 28 0A 0A 0A 0A 0A 0A :D4
4338 0A 0A 0A 0A 0A 0A 0A 0A :A0
4340 0A 0A 14 0A 14 0A 28 0A :CA
4348 0A 14 06 1B 0A 0A 16 06 :30
4350 06 20 0A 14 0A 14 0A 0A :44
4358 14 06 06 1D 0A 0A 0A 0A :02
4360 0A 0A 0A 0A 0A 0A 0A 0A :C8
4368 0A 0A 0A 0A 14 0A 0A 0A :02
4370 0A 0A 0A 0A 0A 0A 0A 0A :D8
4378 0A 0A 0A 1D 0A 0A 0A 0A :2C
4380 0A 14 0A 0A 0A 14 0A 0A :38
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4388 0A 14 05 2F 0A 0A 0A 0A :89
4390 0A 21 0A 0A 0A 21 0A 0A :B0
4398 09 15 28 0A 21 06 06 0A :AE
43A0 28 0A 0A 0A 0A 0A 21 15 :1F
43A8 15 0A 0A 0A 0A 0A 21 0A :BC
43B0 0A 08 15 28 09 09 09 09 :93
43B8 06 06 06 06 09 09 09 09 :DE
43C0 09 09 06 06 06 1B 0A 0A :5B
43C8 07 1A 46 FF 00 FF 00 FF :C3
```

PROGRAM: S/R BASIC

```
7D  0 REM*************************
    ************
65  1 REM****SUICIDE RUN  BASIC
    PROGRAM ****
8F  2 REM********* BY  D.W.LIGHT
     ***********
B3  3 REM******* FOR YOUR COMMOD
    ORE ********
B9  4 REM*************************
    ************
B6  10 REM**ALL REMS & LINES WIT
    H COLONS
2E  12 REM**CAN BE OMITTED.
35  15 :
56  20 POKE52,48:POKE56,48:CLR
BA  30 GOSUB15000:POKEN,2
AD  100 SYSM2:SYSM6:REM*SETUP M/
    CODE
26  110 SYSM3:REM*******PRINT FI
    RST SCREEN
F4  115 PRINTCHR$(19)"  GET READ
    Y "TAB(28)" GET READY "
05  120 GOSUB17000:REM**CRASH
AA  125 PRINTCHR$(19)RV$"[SPC4]S
    TEADY  "TAB(28)"  STEADY[SPC
    3]"
9A  130 GOSUB18000:REM**PARACHUT
    E
18  135 PRINTCHR$(19)RV$"[SPC6]G
    O[SPC4]"TAB(28)"[SPC4]GO[SPC
    5]"
63  140 GOSUB11002:REM**LIVES/SC
    ORE PRINT
E3  150 VT=9:RT=6:RV$=CHR$(146):
    GOSUB5000:RV$=CHR$(18)
C6  155 POKEN,2:PRINTCHR$(19)RV$
    SR$
1E  160 GOSUB6000:PRINTCHR$(150)
    LEFT$(SP$,20)
B0  170 SYSM1
7A  180 GOTO500:REM*****MAIN LOO
    P
84  190 :
24  399 REM**************RESTART
0D  400 U=210:POKE699,0:POKE695,
    0
5B  410 IFPEEK(168)=0THENGOSUB10
    000:U=U-10:GOTO410
87  420 POKE155,1:POKE156,1:POKE
    189,20
B8  430 POKE2040,201:POKES1+4,17

0C  440 POKE741,10:SYSM6:SYSM3
EF  450 GOSUB18000:GOSUB11000:PO
    KE684,0
D6  460 VT=9:RT=10:GOSUB6000:PRI
    NTCHR$(30)"HERE WE GO AGAIN"
    :POKEN,PEEK(CM)
53  470 DE=1000:GOSUB21000:GOSUB
    6000:PRINTLEFT$(SP$,20)
11  480 POKE690,0:POKE680,1
DC  485 :
98  499 REM***MAIN LOOP
AB  500 IFPEEK(680)=0ANDPEEK(733
    )<>0THENGOSUB9000:GOTO400
F7  510 IFPEEK(679)=0THENGOSUB40
    00
E8  520 IFPEEK(695)>0THENPOKE695
    ,0:SC=SC+125:BA=BA+1:GOSUB12
    000
96  530 IFLEFT$(PO$,1)=RV$THENGO
    SUB2000
B7  540 IFPEEK(733)<>0THEN500
12  550 :
6E  600 REM***CRATER COLLISION
9D  610 POKE690,1
80  620 POKES2+5,15:POKES2+6,155
    :POKES2+4,129:POKES1+1,8:POK
    ES2+1,1:POKES3+1,2
41  630 POKES1+5,15:POKES1+6,155
    :POKES1+4,129:POKES3+5,15:PO
    KES3+6,150:POKES3+4,129
C3  640 POKE2040,199:FORI=PEEK(V
    +1)TO188:POKEV+1,I:NEXT:DE=6
    00
69  650 GOSUB21000:GOSUB17075:GO
    SUB9040
56  660 POKE733,1:GOTO400
90  680 :
F3  999 REM***CURSER COLOUR
3B  1000 C%=(PEEK(N)+1)AND7:IFC%
    =0THENC%=1
7B  1010 RETURN
C5  1020 :
B6  1999 REM***PRINT BONUS MESSA
    GE
68  2000 GOSUB1000:POKEN,C%:VT=2
    3:RT=28:GOSUB6000:PRINTPO$:R
    ETURN
DA  2009 :
7A  2010 REM***LOWER HELICOPTER
BC  2020 POKE727,PEEK(727)+8:PO=
    0:SC=SC+1500:PO$=RV$+"B O N
    U S ":RETURN
97  3998 :
D9  3999 REM***PAUSE
4D  4000 GOSUB1000:PRINTCHR$(19)
    ;:POKEN,C%:FORL=1TOLEN(PM$)
60  4020 PRINTMID$(PM$,L,1);:IFP
    EEK(197)<>3THENNEXT:GOTO4000

62  4030 L=LEN(PM$):NEXT
82  4040 PRINTCHR$(19)CHR$(28)SR
    $CHR$(146):RETURN
DB  4050 :
BE  4999 REM***PRESS FIRE
4C  5000 POKES1+5,10:POKES1+6,10

22  5010 GOSUB1000:POKEN,C%:GOSU
    B6000:FORL=1TOLEN(PF$):POKES
    1+4,17
E1  5020 PRINTRV$MID$(PF$,L,1);:
    POKES1+1,ABS(100-L*5):POKES1
    +4,16
01  5030 IFPEEK(JF)AND16THENNEXT
    :POKES1+4,16:GOTO5010
75  5040 L=LEN(PF$):NEXT:POKES1+
    1,0:RETURN
F7  5050 :
0E  5999 REM***PRINT @
6A  6000 PRINTLEFT$(VT$,VT)RIGHT
    $(RT$,RT);:RETURN
47  6500 :
E4  8999 REM***LOSE LIFE
0F  9000 POKES1+4,0:POKE690,1
6B  9030 GOSUB17050:REM***EXPLOS
    ION
65  9040 LI=LI-1:LI$=CHR$(30)+"
     "+LEFT$(LI$,LEN(LI$)-2)
B2  9050 VT=22:RT=28:GOSUB6000:P
    RINTLI$
98  9060 PO$=LEFT$(SP$,10):PO=0:
    VT=23:GOSUB6000:PRINTPO$
27  9070 IFLI>0THENPOKE168,0:RET
    URN
C8  9080 POKE253,216:POKE254,99:
    POKE170,240:POKE687,0
5C  9090 IFSC<=RE(10)THENX=0:C=6
    :POKEV+32,C:GOSUB20040:RETUR
    N
D1  9100 C=5:POKEV+32,C:GOSUB200
    00:RETURN
0F  9998 :
C3  9999 REM***COARSE SCROLL MUS
    IC ?
A8  10000 POKES2+1,U:POKES2+5,6:
    POKES2+6,10:POKES2+4,17:POKE
    S2+4,16:RETURN
A1  10100 :
53  10998 REM***PRINT SCORE BOX
B3  11000 POKEN,2:PRINTCHR$(19)S
    R$
CE  11002 PRINTRV$CHR$(5)LEFT$(V
    T$,21)SB$;
20  11005 REM***YELLOW,WHITE,RED
    ,REV-OFF,GREEN,REV-ON,WHITE
15  11009 REM***GRAPHIC IS SHIFT
     @
F8  11010 PRINT" [S@,YELLOW] GAM
    E-SCORE "SC$" [WHITE,S@,RED]
     LIVES [RVSOFF,GREEN]"LI$"[R
    VSON,WHITE,S@] ";
14  11011 :
51  11015 REM***PURPLE,WHITE,BLU
    E,REV-OFF,REV-ON,WHITE
0C  11019 :
FC  11020 PRINT" [S@,PURPLE] HIG
    H-SCORE "HI$" [WHITE,S@,BLUE
    ] POWER [RVSOFF]"PO$"[RVSON,
    WHITE,S@] ";
01  11030 PRINTSB$CHR$(19):RETUR
    N
71  11040 :
DE  11999 REM***SCORE/UPDATE
87  12000 IFLEFT$(PO$,1)=RV$THEN
    PO$=LEFT$(SP$,10)
6C  12005 PO$="[CC]"+LEFT$(PO$,L
    EN(PO$)-1):REM***COMMODORE C

15  12010 PO=PO+1:IFPO>9THENGOSU
    B2020
E3  12020 VT=23:RT=28:GOSUB6000:
    PRINTCHR$(5)PO$
6A  12030 IN$=MID$(STR$(SC),2):S
    C$=LEFT$("00000",5-LEN(IN$))
    +IN$
0A  12040 VT=22:RT=14:GOSUB6000:
    PRINTRV$CHR$(158)SC$
62  12050 IFSC$>HI$THENHI$=SC$:V
    T=23:GOSUB6000:PRINTRV$CHR$(
    156)HI$
C5  12060 RETURN
71  14100 :
47  14999 REM***VARBS & INSTRUCT
    IONS
09  15000 PRINTCHR$(8)CHR$(147):
    V=53248:POKEV+32,3:POKEV+33,
    9:JF=56320:CM=55696
3F  15010 DIMN$(11),RE(11)
1B  15020 POKE53272,(PEEK(53272)
    AND240)OR14:N=646
20  15030 RV$=CHR$(18):SR$=RV$+"
    [SPC3]SUICIDE RUN[SPC12]SUIC
    IDE RUN[SPC3]"
08  15040 M1=49152:REM***RASTER
    SCROLL
4E  15050 M2=49670:REM***SET UP
    M/C
37  15060 M3=50077:REM***PRINT 1
    ST SCREEN
87  15070 M6=49647:REM***FILL CO
    LOUR RAM
52  15080 M7=49913:REM***SCREEN
    FILL
ED  15100 PRINTCHR$(19)CHR$(18)C
    HR$(159)TAB(14)" SUICIDE  RU
    N "
2F  15105 PRINT"INSTRUCTIONS.":P
    RINT
DD  15110 PRINT" YOU HAVE BEEN U
    NLUCKY ENOUGH TO RECEIVE";
36  15115 PRINT"A SAINT CLAIR C5
    .5 FROM SANTA CLAUS."
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E1  15120 PRINT" YOUR QUEST NOW
    IS TO COLLECT AS MANY"
E2  15125 PRINT"BATTERIES AS POS
    SIBLE WHILST DODGING THE";
9B  15130 PRINT"LANDMINES,MISSIL
    ES AND BOMB-CRATERS.ETC.";
4B  15135 PRINT" THE BATTERIES A
    RE PARACHUTED TO YOU,[SPC3]"
    ;
A2  15140 PRINT"EACH TIME YOU CO
    LLECT TEN YOU RECEIVE A ";
E1  15145 PRINT"SUPER BONUS OF 1
    500 POINTS."
4A  15150 PRINT" YOU HAVE FIVE L
    IVES (";CHR$(5)CHR$(189)CHR$
    (159);") BUT EACH TIME"
E8  15155 PRINT"YOU LOSE A LIFE
    YOUR POWER SUPPLY (";CHR$(5)
    CHR$(188)CHR$(159);") ";
7D  15160 PRINT"ISCOMPLETLY DRAI
    NED.....":PRINT
8E  15165 PRINTTAB(10)CHR$(18)"
    JOYSTICK IN PORT '2' ":PRINT

4A  15170 PRINT"RIGHT-FOREWARD
    .  UP/RIGHT-JUMP FORWARD";
C7  15175 PRINT"LEFT-BACKWARD[SP
    C3].  UP/LEFT-JUMP BACK"
65  15180 PRINT"UP-JUMP UPWARDS
    .":PRINT
07  15185 PRINT"F1-MUSIC ON[SPC5
    ].  F3-MUSIC OFF"
BF  15190 PRINT"F5-PAUSE ACTION
    .  F7-RESTART"
26  15200 SP$="[SPC39]":REM***39
     SPACES
D0  15210 RT$="[RIGHT30]":REM***
    30 CURSER RIGHTS
DB  15220 VT$=CHR$(19)+"[DOWN24]
    ":REM***24 CURSER DOWNS
DB  15225 CU$="[UP5]":REM***5 CU
    RSER UPS
69  15230 S1=54272:S2=S1+7:S3=S2
    +7
AB  15235 REM***SHIFT @
BC  15240 SB$=" [S@38] "
AE  15250 POKEV+28,149:POKEV+37,
    1:POKEV+38,7:REM***SPRITE MU
    LTI-COLOURS
B7  15260 POKEV+23,32:REM***EXP'
    Y'
6E  15270 POKEV+29,74:REM***EXP'
    X'
B5  15280 POKEV+39,2:POKEV+40,1:
    POKEV+41,2:POKEV+42,8
95  15290 POKEV+43,0:POKEV+44,1:
    POKEV+45,13:POKEV+46,2:REM**
    *SPRITE COLOURS
47  15300 SC$="00000":HI$="01275
    ":LI$="[CX] [CX] [CX] [CX] [
    CX] ":PO$=LEFT$(SP$,10)
80  15310 SC=0:PO=0:LI=5:PF$="PR
    ESS 'FIRE' TO PLAY"
6E  15320 FORX=1TO10
00  15322 N$(X)=CHR$(189)+CHR$(3
    2)+CHR$(68)+CHR$(46)+CHR$(46
    )+CHR$(87)
21  15324 N$(X)=N$(X)+CHR$(46)+C
    HR$(46)+CHR$(76)+CHR$(32)+CH
    R$(189)
E2  15326 RE(X)=1500-(125+X*100)

F1  15328 NEXTX
DB  15330 PM$="....PAUSE MODE, P
    RESS F7 TO RESTART...."
F5  15590 VT=25:RT=10:GOSUB6000
D9  15600 PRINTRV$+" "+PF$+" ";:
    REM**SEMI-COLON
EB  15610 IFPEEK(JF)AND16THEN156
    10
CF  15620 RETURN
71  15630 :
```

```
13  16999 REM***OPENING CRASH
62  17000 POKES1+5,15:POKES1+6,6
    :POKES1+4,17:POKES3+5,115:PO
    KES3+6,85:POKES3+4,33
9A  17010 POKES2+5,15:POKES2+6,1
    55:POKES2+4,129
F4  17020 FORI=0TO78:SYS49957:NE
    XT:POKEV+21,1
F2  17030 :
67  17049 REM***EXPLOSION
21  17050 POKES1+5,15:POKES1+6,1
    55:POKES1+4,129
1E  17052 POKES3+5,15:POKES3+6,1
    50:POKES3+4,129
FD  17055 POKES2+5,15:POKES2+6,1
    55:POKES2+4,129:POKES1+1,8:P
    OKES2+1,1:POKES3+1,2
EA  17060 POKE787,PEEK(V+34):FOR
    T=0TO4:FORI=0TO4:POKE2040,19
    2+I
CF  17065 IFPEEK(V+1)<180THENPOK
    EV+1,PEEK(V+1)+T
B6  17070 POKEV+34,(T*I):NEXTI,T
    :POKEV+34,PEEK(787)
81  17075 FORT=0TO3:FORI=0TO3:PO
    KEV+35,(1+T+I):POKE2040,192+
    I:NEXTI,T
44  17080 P=192:FORI=0TO3:POKES2
    +4,33:POKES1+4,129:POKES3+4,
    129:POKE2040,P
9D  17085 IFPEEK(V+1)<185THENPOK
    EV+1,PEEK(V+1)+(I*3)
4B  17090 DE=75:GOSUB21000:P=P+1
    :POKES2+4,32:POKES1+4,128:PO
    KES3+4,128:NEXT
25  17100 POKEV,PEEK(V)-12:POKEV
    +29,PEEK(V+29)OR1
85  17110 P=P-1:IFP>192THENPOKE2
    040,P:GOSUB21000:GOTO17110
18  17150 DE=25
72  17155 FORP=4TO0STEP-1:POKE20
    40,196-P:GOSUB21000:NEXT
DD  17160 POKEV+21,0:FORI=0TO15:
    POKEV+I,0:NEXT
A9  17165 POKES1+5,10:POKES1+6,1
    0:POKEV+29,PEEK(V+29)AND254
1D  17180 DE=500:GOSUB21000:RETU
    RN
49  17200 :
25  17999 REM****PARACHUTE
89  18000 POKEV+1,32:POKE2040,20
    1:POKE2045,202
CC  18010 POKEV,180:POKEV+10,180
    :POKEV+21,33:POKEV+23,PEEK(V
    +23)OR32
61  18015 POKES3+5,125:POKES3+6,
    0:POKES3+4,17
F9  18020 FORI=0TO148:SYS50106:N
    EXT
51  18030 POKES3+4,129
52  18040 FORI=PEEK(V+11)TO0STEP
    -2::SYS50127:NEXT
B3  18050 POKES3+4,128:POKEV+21,
    1:RETURN
E8  18060 :
60  18999 REM***INPUT NAME SPRIT
    E
7C  19000 IFSC<RE(1)THEN19004
C4  19002 VT=7:RT=6:GOSUB6000:PO
    KEN,7:PRINTRV$" YOU ARE THE
    NEW  CHAMPION "
45  19004 POKEV,24:POKEV+1,156:P
    OKEV+23,1:POKEV+29,1
05  19006 POKE2040,200:POKEV+27,
    1:POKEV+21,1
28  19010 P=0:FORI=24TO164:POKEV
    ,I:IFI/4<>INT(I/4)THENP=P+1:
    NEXT
95  19020 POKE2040,200+(PAND1):N
    EXT:POKE2040,200:RETURN
DC  19100 :
01  19999 REM***HALL OF FAME
```

```
93  20000 PRINTCHR$(147)RV$SR$CH
    R$(144)
C7  20002 FORP=0TO4:FORI=0TO3:PR
    INTRV$LEFT$(VT$,15+P)LEFT$(R
    T$,I)" ":NEXTI,P
F8  20003 REM***COMM F & COMM X
0B  20004 POKEN,14:PRINTLEFT$(VT
    $,19)TAB(4)"[CF31]"
C6  20005 POKEN,1:PRINTLEFT$(VT$
    ,5)TAB(5)"[CX29]"
51  20006 FORI=5TO19:PRINTLEFT$(
    VT$,I)TAB(4)"[CX]"TAB(34)"[C
    X]":NEXT
C6  20007 PRINTTAB(4)"[CX31]":GO
    SUB19000
22  20008 VT=7:RT=6:GOSUB6000:PR
    INTCHR$(28)"PLEASE  ENTER YO
    UR NAME AND"
FF  20009 PRINTCHR$(17)CHR$(17)T
    AB(13)CHR$(5)"[..........]"
    CHR$(17)CHR$(17)
7D  20010 PRINTTAB(12)CHR$(159)"
    PRESS  ("CHR$(5)"RETURN"CHR$
    (159)")"CHR$(31)
99  20012 PRINTTAB(14)LEFT$(CU$,
    4)RV$CHR$(46)CHR$(157)CHR$(1
    46);:POKE198,0
25  20014 FORG=0TO1STEP0:GETAN$:
    IFAN$=""THENNEXT
53  20016 IFAN$=CHR$(13)ORLEN(N$
    )>9THENG=1
D0  20018 IFG=0ANDAN$<>" "THENIF
    AN$<"A"ORAN$>"Z"THENNEXT
87  20022 IFAN$<>CHR$(13)THENPRI
    NTCHR$(158)AN$CHR$(31)RV$"."
    CHR$(157)CHR$(146);:N$=N$+AN
    $
4B  20024 NEXTG
80  20026 POKEV+21,0:POKEV+23,32
    :POKEV+29,74:POKEV+27,0
D8  20030 IFLEN(N$)<11THENFORK=L
    EN(N$)TO10:N$=N$+".":NEXT
7A  20035 X=10
8E  20040 POKEN,C:PRINTCHR$(147)
    SR$CHR$(159)LEFT$(VT$,6)
F5  20043 REM***COMMODORE V
1A  20044 FORI=0TO12:PRINTRV$TAB
    (4)"[CV]"TAB(33)"[CV]":NEXT
E2  20045 PRINTTAB(4)RV$"[CV30]"

71  20049 REM***HOME,5 CURSER DO
    WNS,4 CURSER RIGHTS,YELLOW,C
    YAN
0E  20050 PRINTRV$CHR$(159)"[HOM
    E,DOWN5,RIGHT4,CV9,YELLOW]HA
    LL OF FAME[CYAN,CV9]"
D2  20055 PRINTLEFT$(VT$,8)CHR$(
    5)
0E  20079 REM***6 CURSER LEFTS
41  20080 FORJ=1TO10:PRINTTAB(11
    -(J)/9)J" "N$(J)+"[SPC6,LEFT
    6]"RE(J)
61  20090 GOSUB1000:POKEN,C%:NEX
    T
A9  20095 IFX=0THEN20170
DB  20100 IFRE(X)<SCTHENRE(X+1)=
    RE(X):N$(X+1)=N$(X):RE(X)=SC
    :N$(X)=N$:X=X-1:GOTO20055
2E  20170 SC=0:SC$="00000":LI=5:
    LI$="[CX] [CX] [CX] [CX] [CX
    ] ":PO=0:PO$="[SPC10]":N$=""

7C  20180 VT=22:RT=10:GOSUB5000:
    PRINTCHR$(147):POKEN,2:POKE7
    27,64
55  20190 POKEV+32,2:PRINTRV$;:P
    OKEV+34,6:SYSM7:PRINTCHR$(19
    )CHR$(146)SP$
B8  20200 RETURN
A1  20300 :
03  20999 REM***DELAY
64  21000 FORD=0TODE:NEXT:RETURN
```

ED on CP/M

The text editor on CP/M is a complex beast, but without it you'll soon come unstuck.

By Mycroftt Appleby

ED is possibly the most complex and feared transient command in the CP/M repertoire. Without this command there's very little you can do in the field of direct CP/M programming. ED is the text editor on CP/M, and is probably the most awkward one ever invented, but it's still necessary to learn how to use it.

ED was designed in 1973 and has none of the user friendly attributes of more modern systems.

How It Works

ED is a context editor that deals with a text memory buffer, an input file, and an output file. Chunks of text are passed from the input file, through the buffer where they are acted upon, and out to the output file. Occasionally, you need never even see the text!

The facility for passing through a few lines at a time is mainly a hang over from earlier CP/M systems that had little in the way of memory. ED on the C128 can cope with as much as 48K in the buffer area, any file that will not fit into this is beyond the scope of ED.

From here on, I shall assume that you want to edit a pre-created file that is shorter than 48K. The principal for creating a new file is the same expect that you start with an empty file.

To invoke ED you type its name followed by a valid point filename with no wildcard characters. This can then be followed by either the output filename if it is to be different from the input name — or a drive specification if the file is to be output on to a different drive, other than the current default drive. In any other case, the output filename will be the same as the input filename and, at the end, the original file will be overwritten by the new file.

If a separate output filename is specified it must not already exist, otherwise the ED will tell you to erase it and drop you out to the new system.

If all goes well you will see the ED prompt. If it is a new file, then ED will also say 'New File' to remind you. The ED prompt is:

:*

Note the leading spaces, these become significant later.

One word of warning. Check that you have plenty of space left on your disk. If you don't ED will come up with an error message and all will be lost.

In working order

Despite having specified a filename for input, there is still nothing in the computer for you to play with. You have to load it in using the Append command or A.

For our purposes, this comes in two formats: nA where n lines are appended into the buffer; or A which will load the entire file into the buffer and is the command you are much more likely to use.

Once the buffer is full of text you can start to edit. ED works on the concept of a character pointer or CP. This is similar to the cursor except that it works on the whole buffer, so you can't actually see it. Most commands deal with moving the CP or functioning in relation to the CP – deleting from it, inserting at it etc.

nD,-nD: Delete n characters before (-D) or after the CP (D).

Commands

Here, I will give a list of commands which will come in useful when you are working with CP/M.

nA, # A: Append n lines to buffer.
B,-B: Move CP to bottom (-B) or beginning (B) of buffer.
nC,-nC: Move CP n characters forward (C) or backwards (-C) through buffer.
nD,-nD: Delete n characters before (-D) or after the CP(D).
E: Exit ED, saving any changes into a new file.
nFstring^Z: Finds nth occurence of character 'string', terminated with CTL-Z. Omiting n finds the first string.
I: Enters Insert mode. Esc or CTL-Z to return to normal mode.
Istring^Z: Inserts character 'string' at CP, terminated by CTL-Z. If the 'I' is uppercase then all output is forced to uppercase. Lowercase 'i' leaves all input as typed.
J: Juxtapose, this is a rather complex command and takes the form of 'nJsearch-string^Zinsert-string^Z-delete-to-string' where n is the nth occurence of the search-string or the first is omitted. It finds the search-string, searches forwards to find the first occurrence of the delete-to-string and then replaces all intervening text with the insert-string.
nK,-nK: Deletes (Kills) n lines to and from the CP. Functions in the same way as D but on a line level.
nL,-nL,OL: Moves the CP n lines forward (L) or backwards (-L) through the buffer. OL moves to the beginning of the current line.
n,-n: Same function as 'L' but displays the line.
:n: Moves to absolute line n and displays it.
nNstring^Z: Similar to 'F' except that the search is extended to cover the source file on disk. It's much easier to keep the whole file in memory and use 'F'. Command 'H' needs to be used after using this command to clear up the mess.
O: Original file. Abandons all changes made in this session and restores the original file. ED will usually ask for confirmation after this command has been used.

nP,-nP: Move the CP n lines forwards (P) or backwards (-P) and display them on screen.
Q: Quit, returns to CP/M+ and abandons all changes made in a similar manner to O.
nS: Search, takes the form 'nSstring1 ^ Zstring2' where string1 will be replaced by string2 for the first n occurences of string1 that are found. If n is not specified then only the first found occurence of string1 is used. # S will replace all occurences. If 'S' is uppercase then string2 will be converted to upper case.
nT,-nT,OT: Types n lines forward (T) or backwards (-T) on screen. OT types the current line.
V,-V,OV: Turns line numbering on (V) and off (-V). Line numbers fit into the space before the colon described earlier. OV displays the available buffer space and how much has been used.

That sums up all the various general editing commands. Remember, no number before a command usually assumes n=1, a hash symbol(#)usually means the end of the file, all of the file, or 65535 depending on context. n=0 isn't allowed as a valid number but has a special meaning.

Complex Commands

As well as these simple editing commands there are a few complex commands for file manipulation.

H: Kills the old file and re-enters ED using the new file as the origin file.
nM: This is the macro command. Command letters can follow the M separated by Ctl-Zs where CRS would normally fit in. Sequence is executed n times.
:n: This command is followed by either the K, L, or T commands and is a 'through-to' command working in an absolute manner on those commands rather than in the usual relative way. Can be compounded with n: with some interesting results.
Rfile ^ Z: This command will read a library file into the top of the buffer. Library files can be anything, though ED assumes X$$$$$$$.LIB as a default file name.
nW: Writes n lines from the buffer into the new file.
nXfile ^ Z: Writes or appends n lines to the library filename specified, same defaults as R.
OXfile ^ Z: Deletes the file from the disk.
nZ: Waits n seconds. Useful in slowing down multiple M commands to see what is actually happening.

ED Errors

If ED comes into any problems then the message 'BREAK "X" AT c' is displayed, where 'c' is the command letter last used, and 'x' is a character representing the error. Here is a list of common errors:

: Failed search. F, S, or N cannot find the specified string.
?c: Unrecognised command letter.
O: No pre-created LIB file for R to find.
> : Buffer full.
E: Command aborted.
F: File error.

ED can also display CP/M+ errors. As is usual with CP/M errors, recovery is unlikely.

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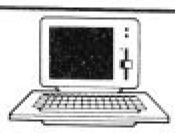
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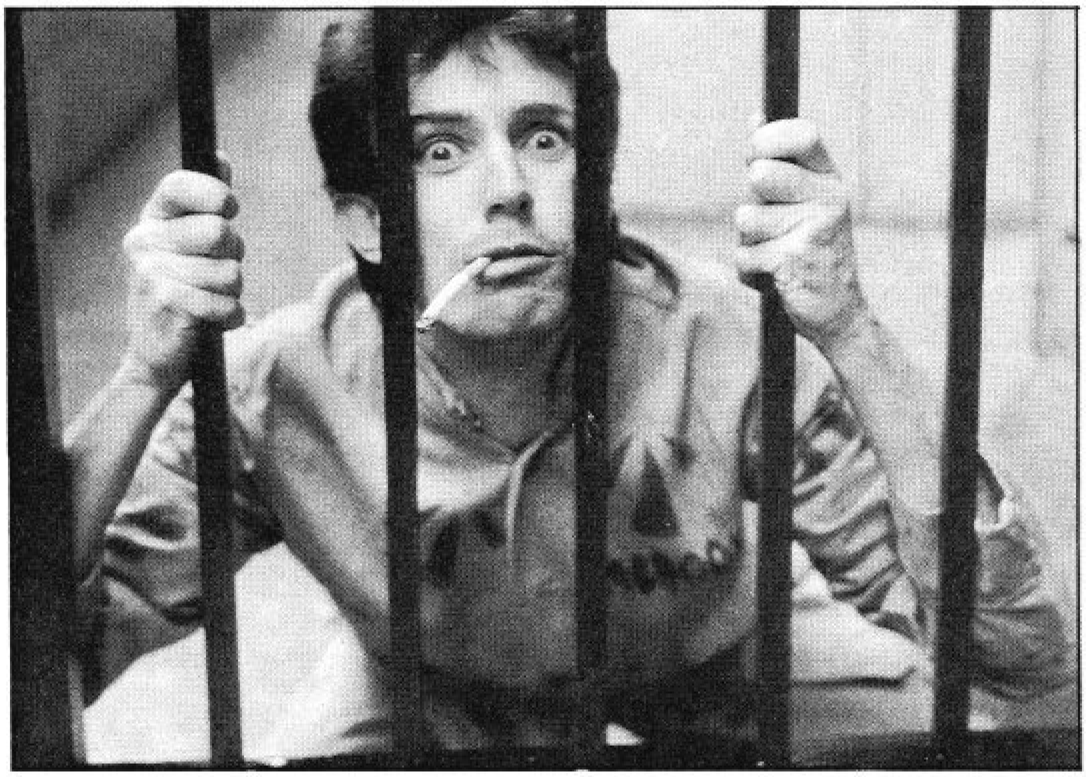
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BREAK



Mark 'Madman' Easton behind bars.

It Cost A Million

Ariolasoft hit problems with its program 'They Stole A Million' that was due out at Christmas time but is only just ready for release.

After a fortune had been spent on the promotion of this product for the Christmas market the accompanying photo shows just where the Product Manager Mark Easton ended up.

We are sure that you can come up with some witty comment that Mark Easton could possibly be saying. A fiver goes to the person who we think provides the best caption before Friday 31st July.

Entries should be sent to: Your Commodore, Cost a Million Caption Competition, 1 Golden Square, London W1R 3AB.

Next Month

Have you sent in witty captions to our recent competitions? Could you have won a fiver? Next month we will be printing what we consider to be the best captions to the competitions run over the last few months. You'll have to wait until then to find out.

OOPS!

We have had a number of queries about programs which appeared in the June 1987 issue of Your Commodore. Below you will find the necessary information for any articles with errors.

Emulator 64

Unfortunately a line was missing from the machine code from this article. The missing line was 7790 and is reproduced in full below:

7790 CO 77 OA OA OA OA 8D 4A:1D

Smart Lister

The commands for appending the lister program to your own had a slight error in them. If you use a commercial append program such as an extended Basic to merge the programs together you will have had no problems. If you want to use the instructions as printed in the magazine this is what you should do:

1) LOAD the program that is to be printed.
2) Merge the Smart Lister program to the program to be printed by entering the following commands:
   POKE43,PEEK(45)-2:POKE44, PEEK(46)
   LOAD the Smart Lister program.
   Enter the following commands:
   POKE43,1:POKE44,8
3) The two programs will now be merged and you will be able to produce your listing by entering: GOTO 63998

List Enhancer

A small error crept into the list of commands for this program. The key to press in order to list the first page of a program is 'T' and not 'I' as stated in the text.

Analyser 128

A number of people have been in touch praising the functions of the Analyser program but are at a loss how to start the program running. Unfortunately the instructions on how to start the program were missing from the text.

In order to start the Analyser program working you should enter the monitor with the command MONITOR and then type G EAOO to start the program running, after you have loaded the program as the instructions with the article state.

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YOUR
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YOUR AMIGA EXTRA INSIDE

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